blancco

CERTIFIED DATA ERASURE

BLANCCO 5

User Manual for version 5.5.0

DEFINITIONS

ITEM	EXPLANATION
4.x, 5.x...	This is the version numbering. The sentence "compatible with 4.x" means that it is compatible with the Erasure client version 4.0, 4.1, 4.2 and so on.
ATA, PATA	Short for Advanced Technology Attachment (ATA) and Parallel ATA. These are interface standards for the connection of storage devices such as HDDs.
B5CT	Blancco 5 Configuration Tool. Blancco software used to configure the Blancco 5 ISO image to best fit the user's needs. Please read the B5CT manual for more information.
BIOS	Acronym for Basic Input/Output System. On PCs, BIOS contains all the code required to control, for example, the keyboard, display screen and disk drives.
BMC	Blancco Management Console. Blancco software used to store and manage Blancco erasure reports. Please read the BMC manual for more information.
Checksum	A checksum or hash sum is a fixed-size datum computed from an arbitrary block of digital data for the purpose of detecting accidental errors that may have been introduced during its transmission or storage.
DCO	Device Configuration Overlay allows system vendors to purchase data storage devices from different manufacturers with potentially different sizes, and then configures all devices to have the same number of sectors.
FEPROM	A rewritable memory chip that holds its content without power. Flash Erasable Programmable Read-Only Memory or "flash memory" is a kind of non-volatile storage device where erasing can only be done in blocks or the entire chip.
Fibre Channel	A serial data transfer architecture. The most prominent Fibre Channel standard is Fibre Channel Arbitrated Loop (FC-AL).
Firmware	In electronic systems and computing, firmware is the combination of persistent memory and program code and data stored in it.
Firmware based erasure	A way of erasing a data storage device (HDD, SSD) using internal commands (located in the device firmware). The erasure commands can differ depending on the drive interface (ATA, SCSI, SAS, SATA…).
Freeze lock	Some BIOS versions offer the ability to lock ATA drives: the access, creation or removal of HPAs/DCOs or the use of commands in Security and Sanitize Device-feature sets to erase the drive are blocked. These locks are called "freeze locks". When the freeze lock is enabled for some feature set, its commands cannot be processed. These locks prevent external software from creating/modifying/ removing HPA or DCO areas, erasing reallocated sectors or performing firmware based erasures.
HASP	Short for Hardware Against Software Piracy, it is a software protection dongle that plugs into an electrical connector on a computer and serves as an electronic "key" for a piece of software. The program will run only when the dongle is plugged in.
HBA	Host Bus Adapter connects a host system to other network and storage devices.
HDD	Hard Disk Drive is a data storage device used for storing digital information using rapidly rotating discs with magnetic surfaces.
Hexviewer	A Hexviewer is a type of computer program that allows a user to access binary computer files. Blancco Hexviewer allows the user to read the binary content of a drive before or after its erasure.

HPA	The Host Protected Area (HPA) as defined is a reserved area on a data storage device. It was designed to store information in such a way that it cannot be easily modified, changed, or accessed by the user, BIOS, or the OS.
IDE	Integrated Drive Electronics is an interface for mass storage devices, in which the controller is integrated into the disk or CD-ROM drive. Although it really refers to a general technology, the term to usually refers to the ATA specification, which uses this technology.
ISO image	An ISO image is an archive file of an optical disc, a type of disk image, composed of the data contents of every written sector of an optical disc, including the optical disc file system.
LAN	A local area network (LAN) is a computer network that interconnects computers in a limited area.
LUN	Logical Unit Number is the identifier of a SCSI logical unit, and by extension of a Fibre Channel or iSCSI logical unit. A logical unit is a SCSI protocol entity which performs classic storage operations such as 'read' and 'write'.
OS	Operating System or OS is a set of software that manages computer hardware resources and provides common services for computer programs. It is a vital component of the system software; programs require an OS to function.
PXE	The Preboot eXecution Environment is an environment to boot computers using a network interface independently of data storage devices or installed operating systems.
RAID	Redundant Array of Independent Disks is a technology that provides increased storage reliability through redundancy, combining multiple disk drive components into a logical unit where all drives in the array are interdependent.
Remapped/Reallocated Sectors	Count of reallocated sectors. When the drive finds a read/write/verification error, it marks this sector as "reallocated" and transfers data to a special reserved area (spare area).
SAS	Short for Serial Attached SCSI, it is a communication protocol used to move data to and from computer storage devices such as hard drives and tape drives. SAS is a point-to-point serial protocol that replaces the parallel SCSI bus technology.
SATA	Serial ATA or SATA is an evolution of the Parallel ATA physical storage interface. SATA is a serial link – a single cable with a minimum of four wires creates a point-to-point connection between devices.
SCSI	Short for Small Computer System Interface, a parallel interface standard used by Apple Macintosh computers, PCs, and many UNIX systems for attaching peripheral devices to computers.
SPI	In Blancco 5, SPI stands for SCSI Parallel Interface, the predecessor of SAS. It is one of the interface implementations in the SCSI family and it defines the electrical signals and connections for parallel SCSI.
SSD	Solid State Drive is a data storage device used for storing digital information using integrated circuit assemblies as memory to store data persistently.
SSID	SSID stands for "Service Set Identifier". An SSID is a unique ID that consists of 32 characters and is used for naming wireless networks. When multiple wireless networks overlap in a certain location, SSIDs make sure that the data gets sent to the correct destination.
UEFI/EFI	Unified Extensible Firmware Interface (UEFI) is a specification that defines a software interface between an operating system and platform firmware. UEFI is

	meant to replace the Basic Input/Output System (BIOS) firmware interface, present in all IBM PC-compatible personal computers.
UI, GUI	Short for User Interface and Graphical User Interface.
WLAN	Wireless LAN, a local area network that uses high frequency radio signals rather than cables to transmit and receive data over distances of a few hundred feet wirelessly.

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1 GENERAL INFORMATION

This manual is written for the Blancco 5 family for x86 based computer architectures.

PLEASE CAREFULLY READ THE NEXT PARAGRAPH BEFORE YOU START USING THE PROGRAM

Thank you for choosing Blancco for your data erasure needs. Before you start using the Blancco Erasure software make sure that all files, folders, software applications or any other information that you want to save for later use are backed up on an appropriate media device other than the original data storage device (HDD, SSD). If you are not sure whether to erase the information on the drive, please contact your system operator, information management or a corresponding party, which maintains the computers in your organization. For future use of the erased computer, an operating system must be installed. Data that has been erased from a data storage device with this program cannot be recovered by any existing method.

Minimum System Requirements

- x86 architecture machine
- 512 MB RAM memory in most cases, erasing servers with 4+ drives requires more RAM
- CD-drive or a CD-compatible drive
- USB-port for exporting / saving reports locally
- SVGA display and VESA compatible video card for graphical user interface
- [Optional] Ethernet NIC, DHCP Server running on local network

Blancco 5 can also be booted from a USB flash drive. A bootable USB flash drive can be created with the help of Blancco USB Creator tool. Contact Blancco for more information.

If there is a dedicated network for erasing machines, Blancco 5 can also boot via a Preboot eXecution Environment or PXE (as long as the machines to be erased support PXE booting). Contact Blancco for more information.

Requirements for the User

Person(s) using this program should have prior experience using computers and the user should, at all times, follow the guidance of this documentation and all guidance given by Blancco.

Booting and Computer Settings

- Check that all the drives are attached properly to the computer. See the manufacturer's guide for this.
- Check that the BIOS clock's time is up to date.
- If you have a laptop computer, plug in the power adapter. There may be problems when erasing a laptop on battery power.

- Disable or type the BIOS passwords requested during the booting up phase. This refers to the passwords that some computers require even before the actual booting starts. Other kinds of BIOS passwords do not usually prevent erasing the drive.
- Disable power saving features from the BIOS.
  Note. This step is usually not needed, but some hardware may have problems if power saving is enabled, so if you have just one license, it is prudent to do this. In a recycling center or corporate environment this should be done only if there are problems with the given computer model when the power saving is on.
- If your Blancco 5 software is in *.iso image form, burn it to a CD or make a bootable USB-stick.
- Switch-on the computer power, put in the Blancco 5 CD and boot the system from the CD (or use the booting that suits you best). Read the section "Accessing the BIOS and changing the boot sequence" for further info.
- Follow the user instructions in order to start erasing the data. Double-check that all data storage devices have been detected correctly so that all the data will be correctly erased from them.

Note. Blancco provides the MD5 checksum of the ISO image in the delivery email. To verify that the MD5-checksum for your image is correct, please use a MD5 checksum verification tool.

Warning! Shutting the computer down, exiting the program, disconnecting the drive(s) or pausing/cancelling the process when Blancco 5 is performing an erasure on the drive(s) with *NIST 800-88 Purge - ATA*, *BSI-GS/E*, *(Extended) Firmware based erasure* or *Blancco SSD Erasure*, can permanently damage the drive(s). This also applies to any erasure with the "Erase remapped sectors" option checked.

Note. In a general way, you should avoid shutting down the computer, exiting the program or disconnecting any drive while erasing it with any standard. This is because all erasure information will be lost and the drive may result damaged.

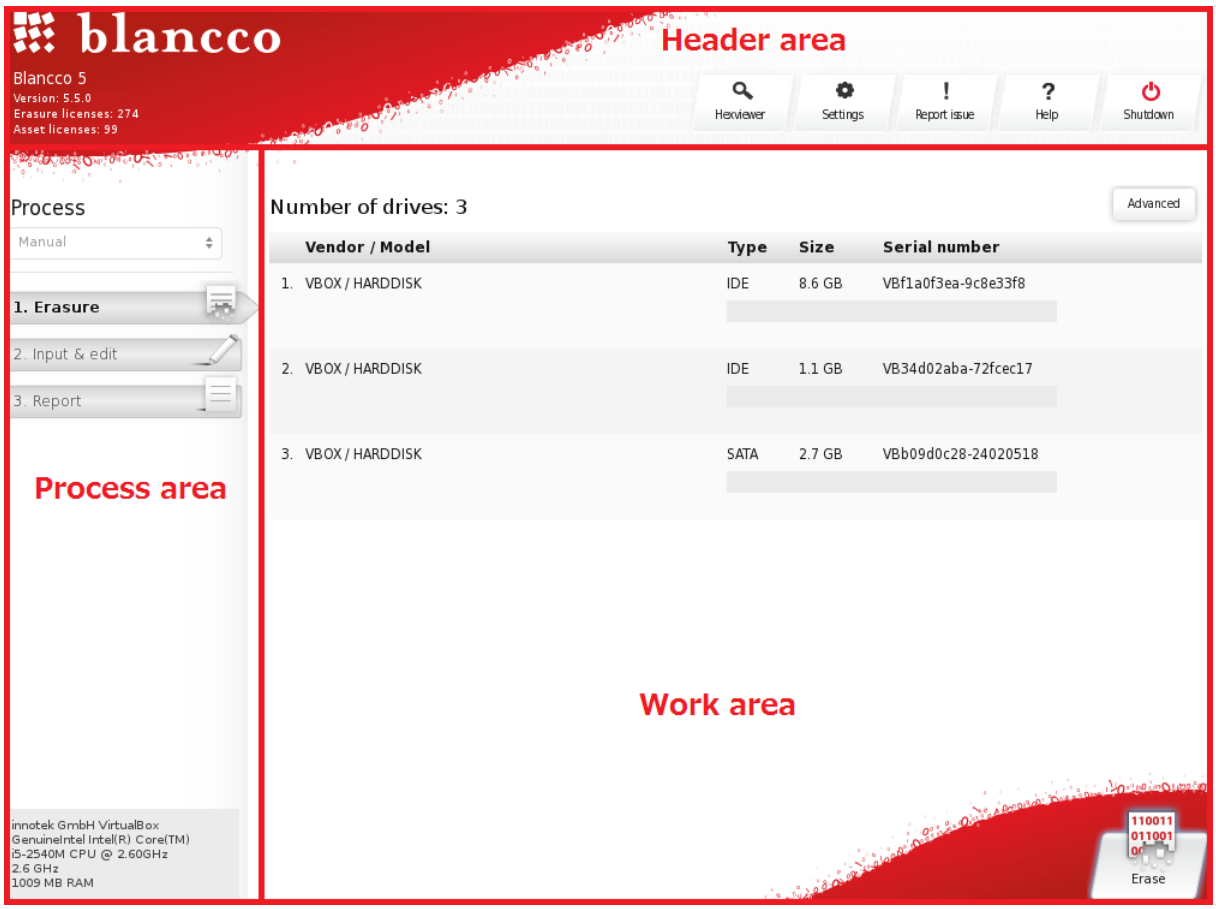
1.1 Legal Notice

Notwithstanding the foregoing, Blancco shall bear no responsibility for any interference, operability, or other compatibility issues which may arise as a result of any changes or updates made to the operating systems and/or hardware upon which the Blancco Software is executed. Likewise, Blancco shall be in no way responsible for any interference, operability, or any other issues resulting from infection of systems and hardware upon which the Blancco Software is executed by any form of virus, Trojan Horse, worm, malware, or spyware of any form or type (collectively referred to hereafter as "Virus" of "Viruses"). The sole responsibility for maintaining a Virus free environment for the operation of the Blancco Software or Hardware solutions shall rest solely with the Company.

The license to the Product is non-transferable and is granted personally to the Licensee, and the Licensee shall not, without prior written consent of Blancco, be entitled to assign or transfer the license for any reason including, without limitation, merger, reorganization, sale of all or substantially all of the assets, change of control or operation of law.

2 BLANCCO 5 USER INTERFACE

When Blancco 5 is booted, the main view is shown after the loading screen. It is divided into three main areas: the header area, the process area and the work area.



2.1 Header area

The header area contains information about the software in use, such as the software name and the version. It also indicates the amount of remaining licenses.

The Header area also contains a series of buttons called Function buttons which have a general purpose, such as changing the user interface language, keyboard layout configuration, screensaver settings, communication settings, reporting an issue, help menu and shutting down the machine.

2.2 Process area

The process area contains the numbered steps required to detect and erase the machine's drives ("Erasure"-step), update the erasure report ("Input & edit"-step), view and back up the erasure report ("Report"-step).

2.3 Work area

The work area contains all the specific information and details for every process step: available drives and erasure standards in "Erasure"-step, additional fields for report editing in "Input & edit"-

step, asset and erasure information in "Report"-step. Moreover, the user can switch between a **Standard** and an **Advanced** view of the UI while performing a drive erasure.

Most of the actions of the user and interaction with the software take place in the Work area.

2.4 Color codes

Several colors are used in the Blancco UI. These colors allow a clear understanding of the current status of an action being carried out.

2.4.1 Gray color

Task has not yet been initialized or is not active.

2.4.2 Green color

The task has been completed successfully. E.g. selected drive erased successfully, additional report fields updated successfully and report sent/saved successfully.

2.4.3 Yellow color

User action is required. E.g. drive erasure is paused (requires user intervention). Also, if an erasure raises a warning, a "yellow" informative message is written in the report.

2.4.4 Red color

Given task has failed. E.g. drive erasure process has failed or has been cancelled, input is mandatory but nothing has been written in the input-field or report sending/saving has failed.

2.4.5 Blue color

Process or given task is running. E.g. drive erasure process is running, ongoing erasures additional fields are being updated or sending/saving report is still in progress.

3 HEADER AREA

3.1 Software version and license control

Blancco 5 software version is located on the top left of the screen, under the logo. Information about the amount of remaining licenses is displayed below the software version number:

Blancco 5 has two different license types:

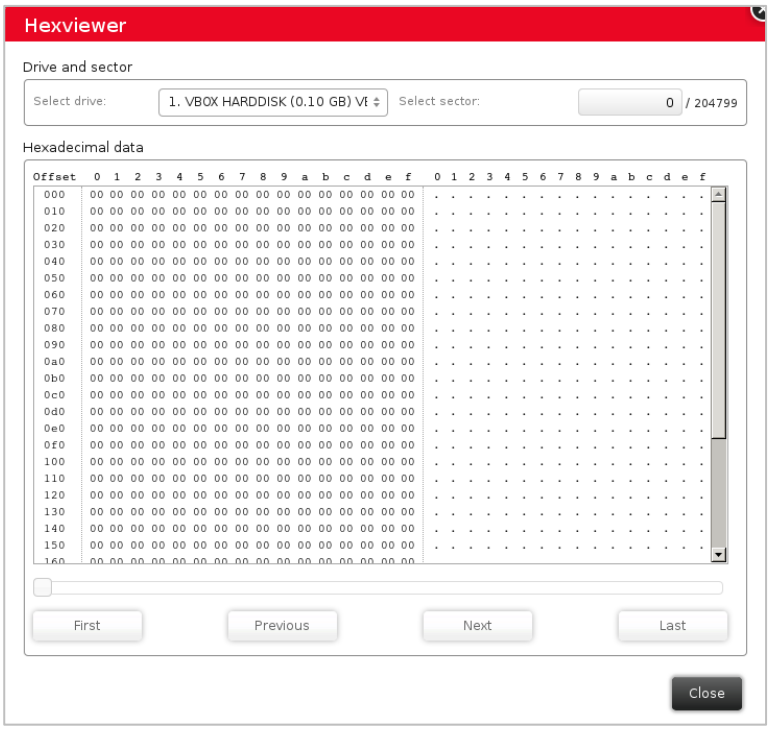
- Erasure licenses: these licenses are necessary to erase drives. Consuming one erasure license allows the user to save/send reports.
- Asset licenses: in case there are no Erasure licenses (or if the user hasn't erased any drive), these licenses are necessary to save or send a report with all the hardware information of the machine (asset report).

Blancco 5 license control is done either from a local HASP dongle, or from the BMC via the network. **There must be enough licenses in order to start the erasure or save/send an asset report.**

If the license container cannot be reached, the following messages will be displayed:

3.2 "Hexviewer" function button

The Hexviewer is used to check the content of a storage media in hexadecimal format. Whenever a drive is overwritten with Blancco 5, a pattern (either static or random) is used to overwrite it: the hex-format of this pattern (e.g. 0x00, 0xAA, 0x924924…) can be viewed with the Hexviewer thus providing a visual verification of the performed erasure result.


Hexviewer
Drive and sector
Select drive:
1. VBOX HARDDISK (0.10 GB) Vt
Select sector:
0
/ 204799
Hexadecimal data
Offset 0 1 2 3 4 5 6 7 8 9 a b c d e f 0 1 2 3 4 5 6 7 8 9 a b c d e f
First
Previous
Next
Last
Close

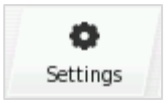
Name	Example	Description
Drive and sector		
Select drive:	*1 VBOX HARDDISK (8.6GB) Vbed6ccd6e*	Dropdown-list displaying all detected drives, used to select the storage media to hex-view. Each drive is identified with its number, vendor and model, capacity and serial number.
Select sector:	*100 / 204799*	Sector being viewed currently, displayed against the total amount of sectors of the drive. Typing a sector number and pressing the Enter-key will show the sector in question. Note that the first sector is numbered 0 i.e. a drive with 100 sectors will have sectors in the range 0-99.
Hexadecimal data		
Left column	*48 69 21 00 AA*	The left side of the Hexviewer displays the sector's data in hexadecimal format. If the sector size is 512 bytes, the left side will be a 32 x 16 matrix.
Right column	*H i ! . .*	The right side of the Hexviewer displays the sector's data in ASCII format. If the sector size is 512 bytes, the left side will be a 32 x 16 matrix. Non-printable ASCII chars and non-ASCII chars are represented by a dot ("..").
Horizontal slider	-	Used to scroll through different sectors. Whenever dragged with the mouse or moved with the Arrow keys, it will jump several sectors forward/backward (a jump equivalent to roughly 1% of the drive's total amount of sectors).
"First" button	-	Moves to and displays the first sector of the drive.

"Previous" button	-	Moves to and displays the previous sector.
"Next" button	-	Moves to and displays the next sector.
"Last" button	-	Moves to and displays the last sector of the drive.

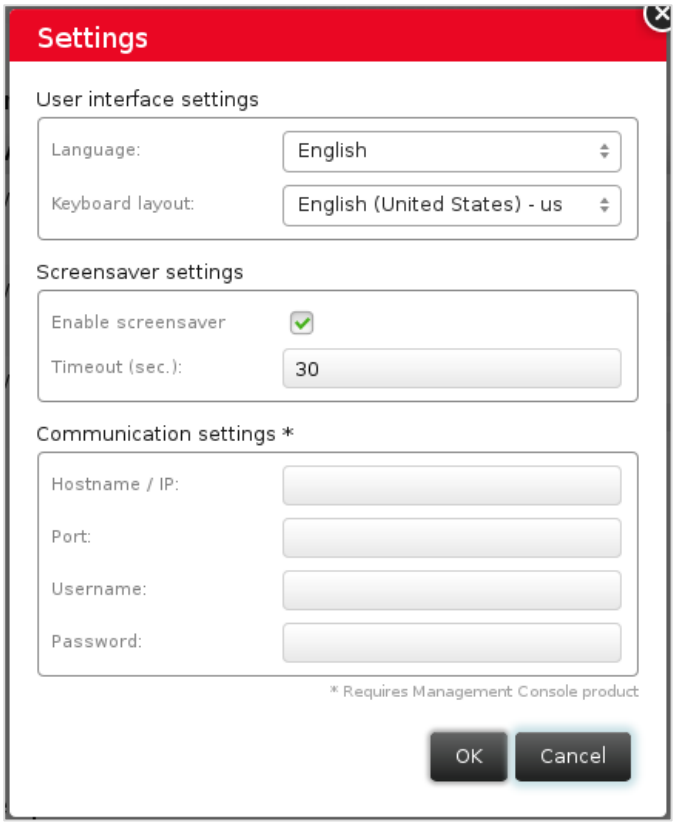
The Hexviewer can also be used to read the Digital Fingerprint information, please check chapter Digital Fingerprint for more information.

3.3 "Settings" function button

The Blancco 5 settings are accessed via the "Settings"-button.



Pressing the button opens the Settings-window. This window contains information related to the User Interface and the BMC connectivity:



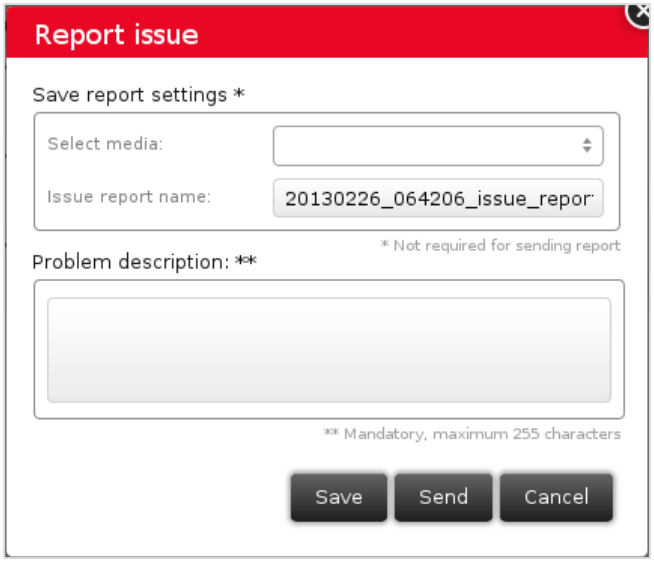
Name	Example	Description
User Interface settings		
Language:	*English – en*	The language used in the software.
Keyboard Layout:	*English (United States) - us*	Keyboard layout used in the system.
Screensaver Settings		
Enable screensaver	*On or Off*	Enable/disable the screensaver.

Timeout (sec.):	*30*	Timeout of the screensaver (in seconds), time of inactivity before the screensaver is turned on. Possible values: from 5 sec. to 86400 sec. (1 day).
Communication settings		
Hostname / IP:	*10.1.1.1*	IP-address of the server running the BMC.
Port:	*8443*	Port number of the BMC. This port was set up when installing the BMC; it is the port 8443 by default (HTTPS protocol always enforced). Please check the BMC manual for more information.
Username:	*ExampleMCUser*	User for accessing the BMC.
Password:	*VeryStrongPassword*	Password for accessing the BMC.

3.4 "Report Issue" function button

If issues are found, they can be reported by pressing the "Report issue"-button: with this button the user generates a detailed report that contains additional system information and logs used to understand and reproduce the problem. These issue reports have to be attached and sent via email to Blancco Support for further analysis.

Pressing the button opens the Report issue-window:



The window is divided in to two fields: "Problem description"-field and settings related to saving the issue report on an external media device. "Problem description" is mandatory, because it explains the problem.

If you want to save an issue report on an external device (USB-stick), first plug the media device into the machine, then press the "Report issue"-button. The settings for saving the issue report consist of:

- "Select media"-dropdown menu, and select the appropriate media device (USB-stick) to save the issue report.
- "Issue Report Name"-field, which defines the file name of the report. The default name of the report follows the format: Date(yyyymmdd)_time(hh24miss)_issue_report
    - A report named "20121205_164206_issue_report" was created 5th of December, 2012 at 4:42:06 PM.
    - This name can eventually be changed before saving the issue report to the external media.
- The only available file format is XML (it will automatically be added to the issue report name).
- "Save"-button, press this button to save the issue report on your external device (USB-stick).

The other available buttons in the window are:

- "Send"-button, for sending the issue report to the BMC. This requires:
    - a network connection and a server running the BMC,
    - correct Communication settings filled in the "Settings"-window.
- "Cancel"-button, to cancel the issue report generation and exit the window.

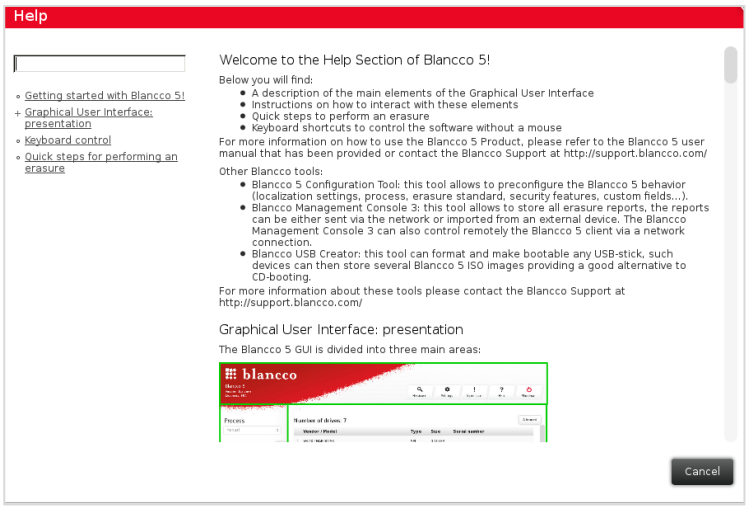
3.5 "Help" function button

The "Help"-button is used to open the quick-help menu.

Pressing this button opens the Help-window. This window contains information about the GUI (Graphical User Interface), header area, process and working areas, keyboard control of Blancco 5 and also a quick guide for performing erasures.

The Help window consists of two columns:

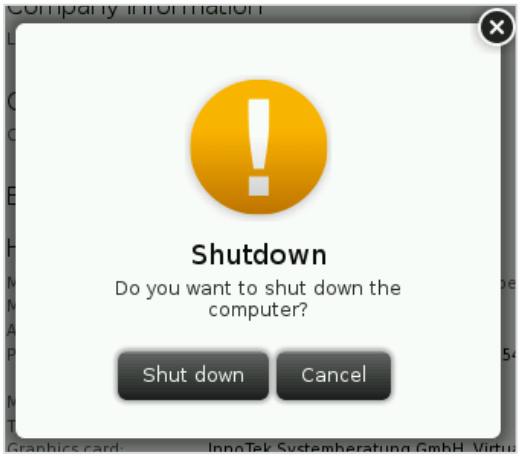
- the left column contains the Help table of contents as well as a search box,
- the right column contains the Help content, selecting a chapter in the table of contents will automatically update the content.


Help
Getting started with Blancco 5!
Graphical User Interface: presentation
Keyboard control
Quick steps for performing an erasure
Welcome to the Help Section of Blancco 5!
Below you will find:
A description of the main elements of the Graphical User Interface
Instructions on how to interact with these elements
Quick steps to perform an erasure
Keyboard shortcuts to control the software without a mouse
For more information on how to use the Blancco 5 Product, please refer to the Blancco 5 user manual that has been provided or contact the Blancco Support at http://support.blancco.com/
Other Blancco tools:
Blancco 5 Configuration Tool: this tool allows to preconfigure the Blancco 5 behavior (localization settings, process, erasure standard, security features, custom fields...).
Blancco Management Console 3: this tool allows to store all erasure reports, the reports can be either sent via the network or imported from an external device. The Blancco Management Console 3 can also control remotely the Blancco 5 client via a network connection.
Blancco USB Creator: this tool can format and make bootable any USB-stick, such devices can then store several Blancco 5 ISO images providing a good alternative to CD-booting.
For more information about these tools please contact the Blancco Support at http://support.blancco.com/
Graphical User Interface: presentation
The Blancco 5 GUI is divided into three main areas:
blancco
Cancel

3.6 "Shutdown" function button

In order to shut down the machine after a successful erasure, click on the "Shutdown" button.

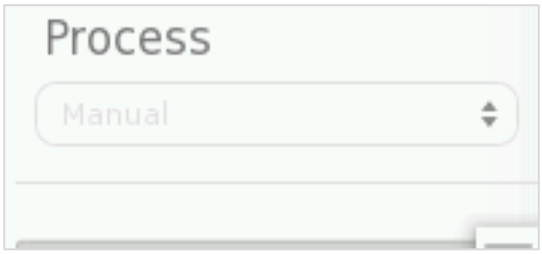
After pressing the button, a confirmation popup window will appear. Confirm that you really wish to shut down the machine by clicking on "Shut down". The machine then powers off.



4 PROCESS AND WORK AREAS

4.1 Processes

Processes define how the erasure process is handled and how much user interaction it requires. All processes consist of predefined steps which are numbered and have to be followed to complete an erasure and a report generation. There are three default processes: "Manual", "Semi-automatic" and "Automatic". The configured process is visible in the Blancco 5 UI but can only be changed via the B5CT software.



4.1.1 Manual

In this mode, everything is done manually. The erasure must be started by the user. The user must then manually send the report to the BMC or save it to a USB memory stick. Updating custom fields must also be done manually.

4.1.2 Semi-automatic

In this mode the erasure is automatically started and the report is automatically sent. Report saving is optional and must be done manually. Updating custom fields must also be done manually.

4.1.3 Automatic

In this mode the erasure is automatically started and the report is automatically sent to the BMC. Report saving is optional and must be done manually. Updating custom fields is optional, but it is performed automatically before sending the report. The user can still do this manually as well.

4.2 "Erasure"-step

The "Erasure"-step is the first defined default step. When clicking on this step, the user can see in the work area the drives available for erasure. The erasure step's tab also shows some information about the erasures' overall process.

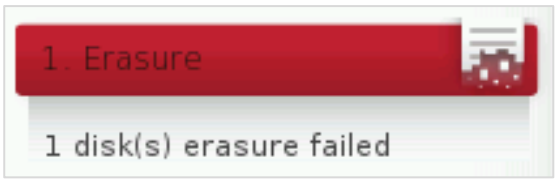
4.2.1 Tab color and overall progress

The "Erasure"-step tab's color informs of the overall erasure progress: not started (gray), ongoing (blue), successful (green), failed or canceled (red), paused (yellow). Whenever there is at least one erasure ongoing, the erasure percentage is also displayed in the tab. Information about the number of drives being erased and their status is also written under the erasure tab.

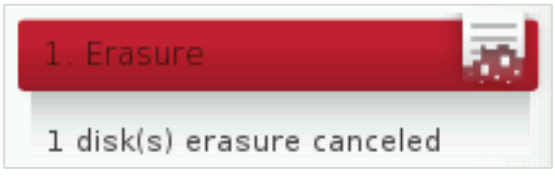
Erasure tab – erasure not yet started

Erasure tab – ongoing erasure(s)

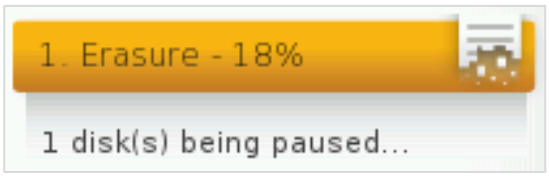
Erasure tab – successful erasure(s)



Erasure tab – failed erasure(s)



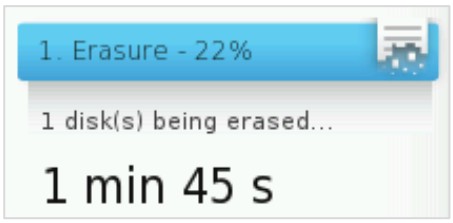
Erasure tab – canceled erasure(s)



Erasure tab – paused erasure(s)

4.2.2 Remaining time and state icon

Indication of the remaining erasure time is also displayed under the "Erasure" tab.



The following icons are shown under the "Erasure" tab when erasures are in different states:

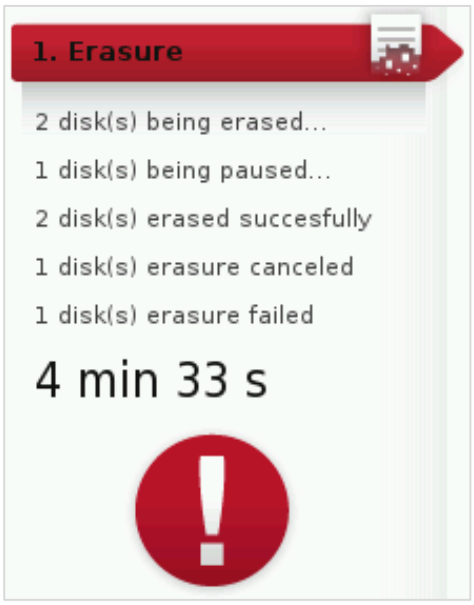
All erasures have been successful.

At least one erasure was canceled by the user. This overrules the successful-icon.

At least one erasure has been paused by the user. This overrules the canceled-icon.

At least one erasure has failed. This overrules the paused-icon.

If there are multiple drives in different states, then the erasure-tab may look like the next picture:



4.2.3 Work area

More specific functionality and information is shown in the work area. Most of the physical interaction with the software is done in this area.

In the top right of the Work area there is a single button that allows changing between two views: the "Standard" view and "Advanced" view.

- from the Standard view (default view), the user will be able to access the Advanced view by clicking this button:

- from the Advanced view, the user will be able to access the Standard view by clicking this button:

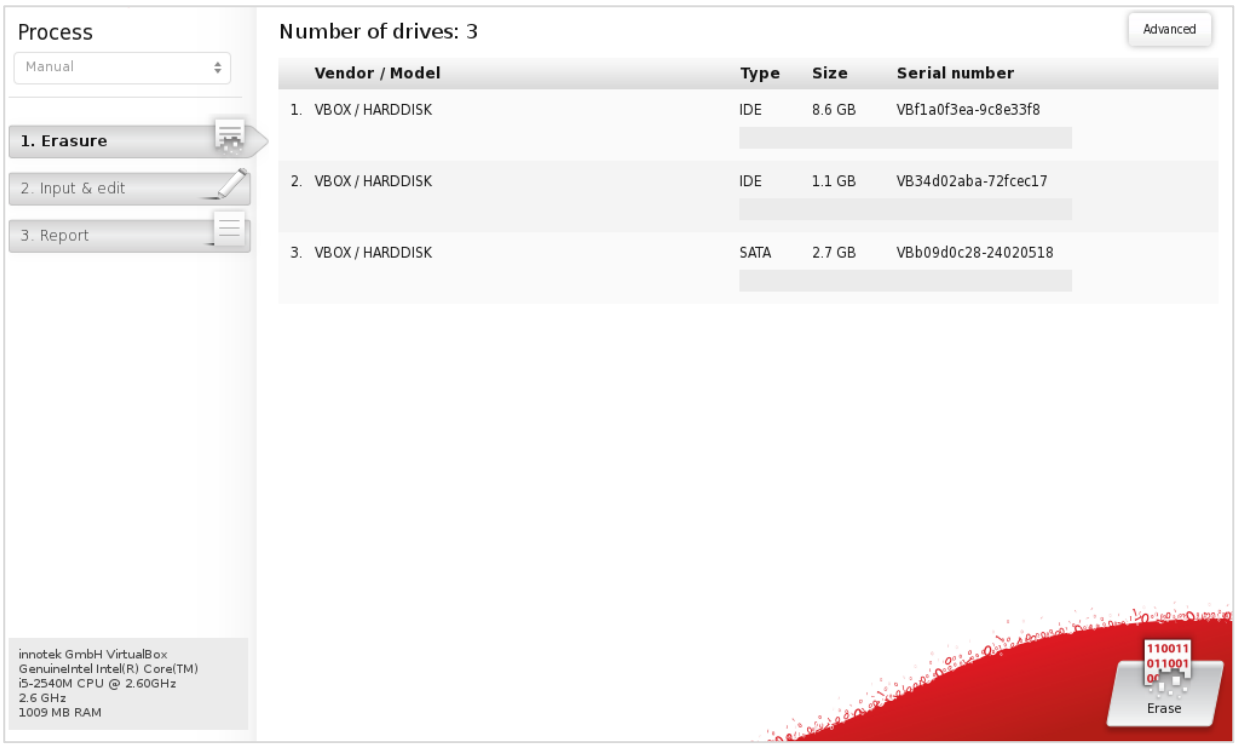
These views affect how much data is shown and how much control the user has over the work area.

4.2.3.1 Standard view

This view is accessed via the "Standard" button. In this view, the user only has the ability to start the erasure. All the drives connected and running in the computer are shown in the view: by default, they are selected for erasure. Please check that the drives have been correctly identified. The drive information available in the GUI is:

- Number of drives,
- Vendor/Model – vendor or the model of the drive,
- Type – connection type (SATA, SPI, SSD…),
- Size – size of the drive (in GB),

- Serial number – serial number of the drive.

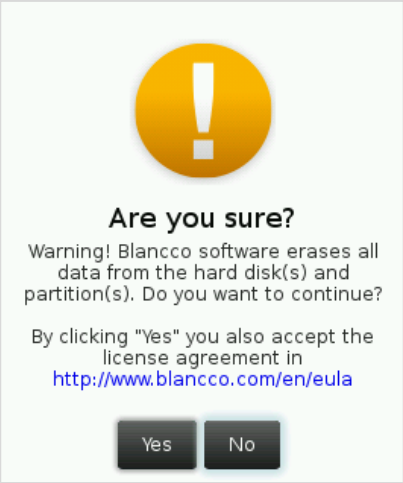


4.2.3.1.1 Erase-button

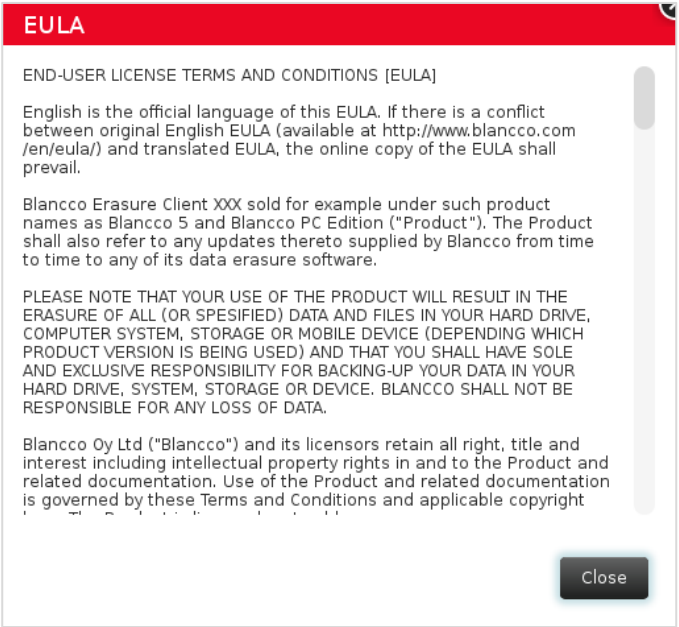
In order to start the erasure, the user has to press the "Erase" button, which is located on the bottom right of the screen:

- The erasure method (or standard) used is always the default one, so is the verification level and the remapped sectors erasure (all selected when configuring the ISO image with the B5CT),
- The erasure of each drive can be monitored via the drive's progress bar.

After the "Erase"-button is pressed the following confirmation window is shown. Pressing "Yes" continues to the erasure. Pressing "No" exits the window and does not start the erasure.


Are you sure?
Warning! Blancco software erases all data from the hard disk(s) and partition(s). Do you want to continue?
By clicking "Yes" you also accept the license agreement in http://www.blancco.com/en/eula
Yes
No

The lower part of the confirmation window has a URL that opens a window containing a copy of the Blancco EULA (End User License Agreement). The EULA can also be read from the Internet at the following URL (http://www.blancco.com/en/eula/):


EULA
END-USER LICENSE TERMS AND CONDITIONS [EULA]
English is the official language of this EULA. If there is a conflict between original English EULA (available at http://www.blancco.com /en/eula/) and translated EULA, the online copy of the EULA shall prevail.
Blancco Erasure Client XXX sold for example under such product names as Blancco 5 and Blancco PC Edition ("Product"). The Product shall also refer to any updates thereto supplied by Blancco from time to time to any of its data erasure software.
PLEASE NOTE THAT YOUR USE OF THE PRODUCT WILL RESULT IN THE ERASURE OF ALL (OR SPESIFIED) DATA AND FILES IN YOUR HARD DRIVE, COMPUTER SYSTEM, STORAGE OR MOBILE DEVICE (DEPENDING WHICH PRODUCT VERSION IS BEING USED) AND THAT YOU SHALL HAVE SOLE AND EXCLUSIVE RESPONSIBILITY FOR BACKING-UP YOUR DATA IN YOUR HARD DRIVE, SYSTEM, STORAGE OR DEVICE. BLANCCO SHALL NOT BE RESPONSIBLE FOR ANY LOSS OF DATA.
Blancco Oy Ltd ("Blancco") and its licensors retain all right, title and interest including intellectual property rights in and to the Product and related documentation. Use of the Product and related documentation is governed by these Terms and Conditions and applicable copyright
Close

Warning! If a drive has a Freeze lock, Blancco 5 can attempt to remove it: in such case, the screen may momentarily turn off but should resume after few seconds. Please be patient and wait for the screen to resume. For more information about Freeze lock, see the chapter Freeze lock.

4.2.3.1.2 Drive's progress bar

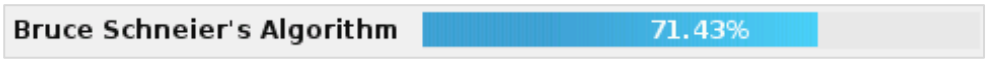
The erasure progress of each individual drive can be monitored via a progress bar, which displays the erasure state, erasure standard and erasure percentage.

Not started

In this state, the erasure has not been started or the selected drive is not active.

Active/Ongoing

In this state, the erasure process is being performed. The progress is shown by the blue bar and the percentage of completion. The erasure standard used for erasure is shown on the left side of the progress bar.

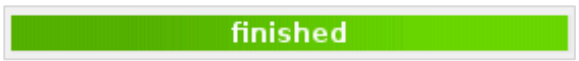


Paused

In this state, the erasure has been paused. The erasure can be resumed by pressing the resume-button or canceled by pressing the cancel-button (these buttons are only available in the "Advanced" view).

Finished

When the erasure has been successfully completed, the progress bar looks like this:



Canceled

If the erasure has been canceled, the progress bar looks like this:

Failed

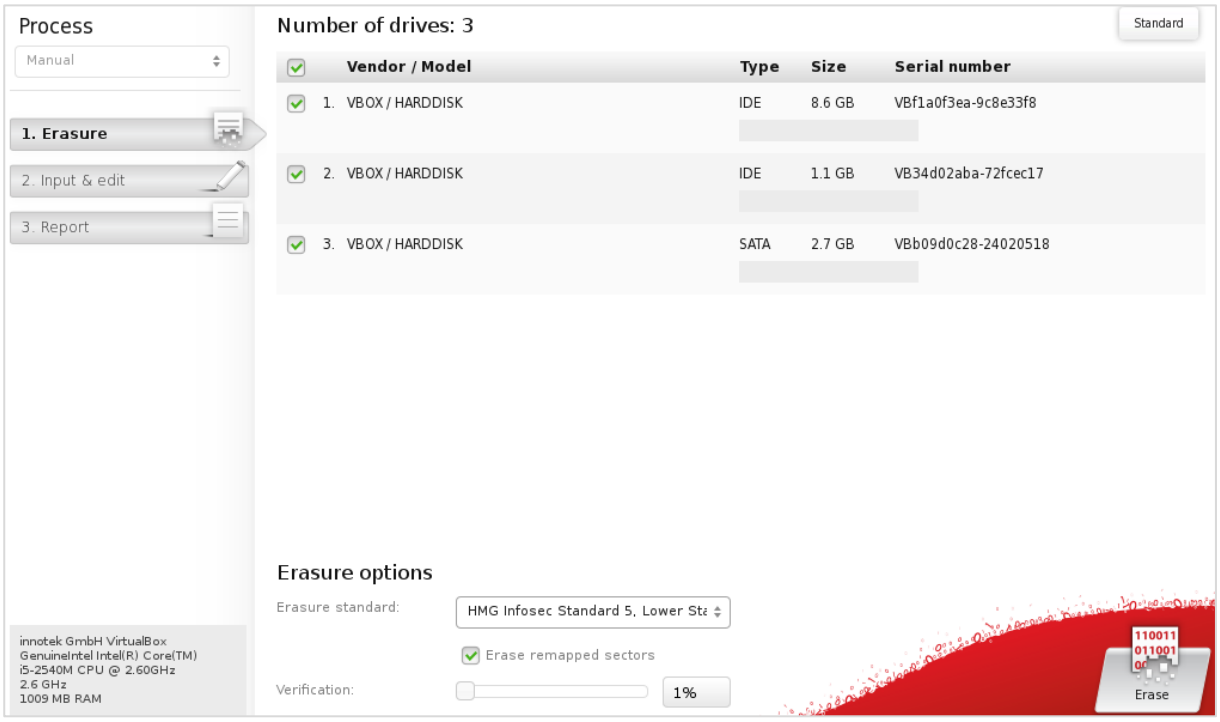
If the erasure has failed, the progress bar looks like this:

4.2.3.2 Advanced view

This view is accessed via the "Advanced" button. In this view the user can individually select or group the drives for erasure. The erasure method (or standard) the user wants to use, whether or not the remapped sectors are erased from the drive as well as the level of the verification (which is done during or after the erasure) can also be defined individually or per group. By clicking "Erase", the software starts the erasure process for all of the selected drives. The progress bar and time remaining indicator show how long it takes before the process completes.

All the drives connected and running in the computer are shown in the view. Please check that the drives have been correctly identified. The drive information available in the GUI is:

- Number of drives,
- Vendor/Model – vendor or the model of the drive,
- Type – connection type (SATA, SPI, SSD…),
- Size – size of the drive (in GB),
- Serial number – serial number of the drive.



4.2.3.2.1 Erasure standards

The erasure method or standard used to wipe out the drives can be selected from the "Erasure standard" drop-down list:

Blancco 5 supports up to 19 erasure standards. See the detailed list below:

*: standard including a firmware based erasure step

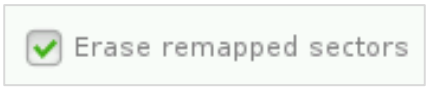
Available erasure standards in Blancco 5	Overwriting rounds
Air Force System Security Instruction 5020	**4**
Blancco SSD Erasure - ATA	**2+ ***
Bruce Schneier's Algorithm	**7**
BSI-GS	**1-2 ***
BSI-GSE	**2-3 ***
DoD 5220.22-M	**3**
DoD 5220.22-M ECE	**7**

NIST 800-88 Clear	**1**
NIST 800-88 Purge - ATA	**0 ***
Firmware based Erasure	**0 ***
Extended Firmware based Erasure	**1 ***
HMG Infosec Standard 5, Higher Standard	**3**
HMG Infosec Standard 5, Lower Standard	**1**
National Computer Security Center (NCSC-TG-025)	**4**
Navy Staff Office Publication (NAVSO P-5239-26)	**3**
NSA 130-1	**3**
OPNAVINST 5239.1A	**3**
Peter Gutmann's Algorithm	**35**
U.S. Army AR380-19	**3**

Erasure standards supported by Blancco 5. See the chapter Execution steps of the erasure standards for more information

4.2.3.2.2 Erase remapped sectors

The erasure of remapped sectors can be enabled by checking the "Erase remapped sectors" checkbox. Please find more detailed information about remapped sectors in the Remapped sectors section.



4.2.3.2.3 Verification

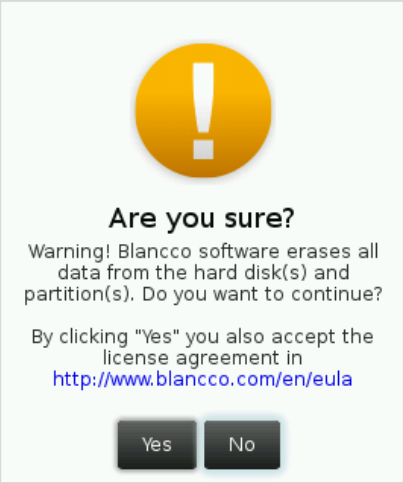
The amount of verification done during or after the drives' erasure can be selected from the "Verification" slider:

See the Erasure verification section for more details.

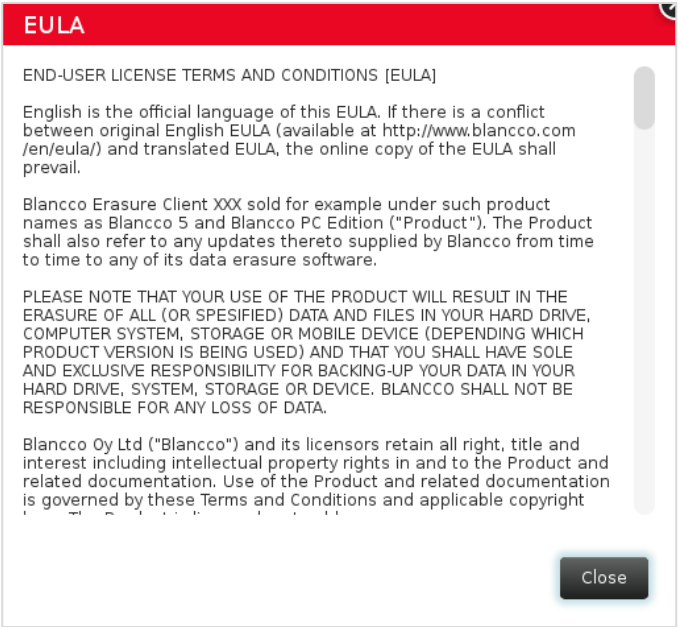
4.2.3.2.4 Erase-button

The erasure process is always started from the "Erase" button, which is located on the bottom right of the screen.

After the "Erase"-button is pressed the following confirmation window is shown. Pressing "Yes" continues to the erasure. Pressing "No" exits the window and does not start the erasure.


Are you sure?
Warning! Blancco software erases all data from the hard disk(s) and partition(s). Do you want to continue?
By clicking "Yes" you also accept the license agreement in http://www.blancco.com/en/eula
Yes
No

The lower part of the confirmation window has a URL that opens a window containing a copy of the Blancco EULA (End User License Agreement). The EULA can also be read from the Internet at the following URL (http://www.blancco.com/en/eula/):


EULA
END-USER LICENSE TERMS AND CONDITIONS [EULA]
English is the official language of this EULA. If there is a conflict between original English EULA (available at http://www.blancco.com /en/eula/) and translated EULA, the online copy of the EULA shall prevail.
Blancco Erasure Client XXX sold for example under such product names as Blancco 5 and Blancco PC Edition ("Product"). The Product shall also refer to any updates thereto supplied by Blancco from time to time to any of its data erasure software.
PLEASE NOTE THAT YOUR USE OF THE PRODUCT WILL RESULT IN THE ERASURE OF ALL (OR SPESIFIED) DATA AND FILES IN YOUR HARD DRIVE, COMPUTER SYSTEM, STORAGE OR MOBILE DEVICE (DEPENDING WHICH PRODUCT VERSION IS BEING USED) AND THAT YOU SHALL HAVE SOLE AND EXCLUSIVE RESPONSIBILITY FOR BACKING-UP YOUR DATA IN YOUR HARD DRIVE, SYSTEM, STORAGE OR DEVICE. BLANCCO SHALL NOT BE RESPONSIBLE FOR ANY LOSS OF DATA.
Blancco Oy Ltd ("Blancco") and its licensors retain all right, title and interest including intellectual property rights in and to the Product and related documentation. Use of the Product and related documentation is governed by these Terms and Conditions and applicable copyright
Close

Warning! If a drive has a Freeze lock, Blancco 5 can attempt to remove it: in such case, the screen may momentarily turn off but should resume after few seconds. Please be patient and wait for the screen to resume. For more information about Freeze lock, see the chapter Freeze lock.

4.2.3.2.5 Drive's progress bar

The erasure progress of each individual drive can be monitored via a progress bar which displays the erasure state, erasure standard, percentage of erasure, erasure speed and also offers the possibility to pause and/or cancel the erasure.

Not started

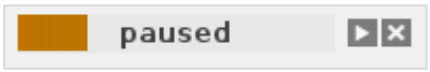
In this state, the erasure has not been started or the selected drive is not active.

Active/Ongoing

In this state, the erasure process is being performed. The progress is shown by the blue bar and the percentage of completion. Current write speed and pause/stop buttons are displayed next to the progress bar. The erasure standard used for the erasure is shown on the left side of the progress bar.

Paused

In this state, the erasure has been paused. The erasure can be resumed by pressing the resume-button or canceled by pressing the cancel-button.



Finished

When the erasure has been successfully completed, the progress bar looks like this:

Canceled

If the erasure has been canceled, the progress bar looks like this:

Failed

If the erasure has failed, the progress bar looks like this:

Pause button

This button pauses the ongoing erasure.

Resume button

This button resumes a paused erasure.

Cancel button

This button cancels an ongoing erasure.

4.2.3.2.6 Drive info-icons

Depending on the drive, several icons can appear under the progress bar. The icons can be:

Remapped sectors count

This icon will appear if remapped sectors are detected on the drive. The number displayed after the **Remapped** string is the number of remapped sectors detected on the drive.

The number of detected remapped sectors can change during the erasure, as it is first detected before the erasure takes place but it can be updated after the erasure (in particular if the erasure standard includes a firmware based erasure step).

Bad sectors count

This icon will appear if "bad sectors" (read and write errors) are detected on the drive. The number displayed after the **Errors** string is the number of read and write errors occurring during the erasure.

The number of errors can change during the erasure, as it is detected in real time.

Hidden areas

These icons will appear if hidden areas are detected on the drive. The possible hidden areas are **DCO**, **HPA** or both.

The detected hidden areas info can change after the erasure, as they are first detected before the erasure takes place but they may be removed during the erasure (and not be displayed after it).

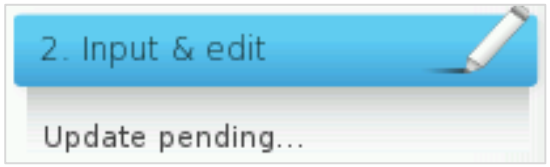
4.3 "Input & edit"-step

The "Input & edit"-step is the second defined default step. In this step, the erasure report can be edited before, during and after the erasure.

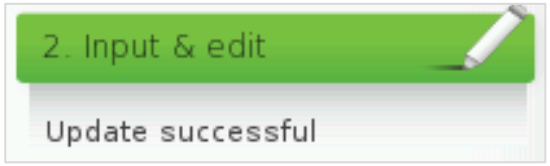
4.3.1 Tab color and overall progress

The "Input & edit"-step tab's color informs of the overall report editing progress: not started (gray), ongoing (blue), successful (green), incorrect (red).

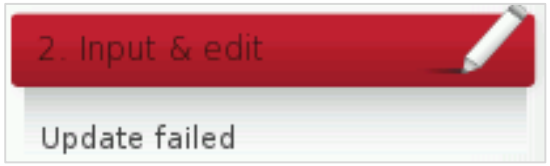
Input & edit tab – report editing not started.



Input & edit tab – text has been filled into the fields but it is not yet validated.



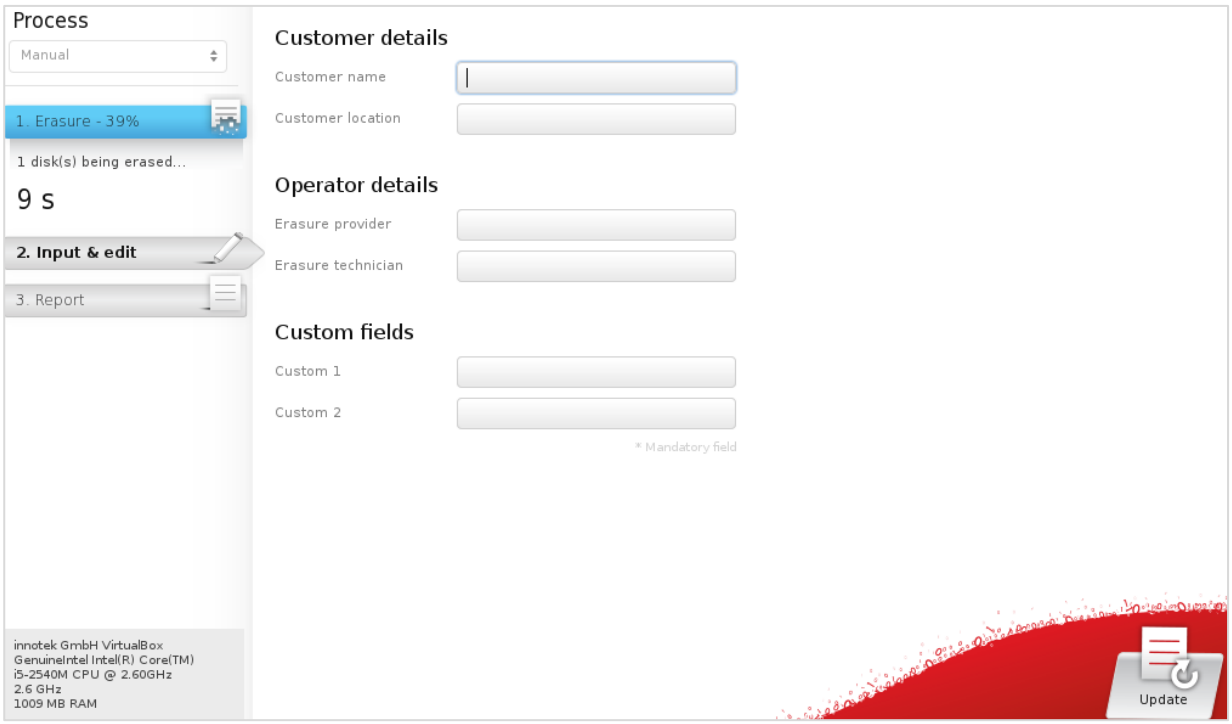
Input & edit tab – fields have been filled in and validation is successful.



Input & edit tab – validation is not successful, mandatory fields have been left empty.

4.3.2 Work area

The Customer details, the Operator details as well as all the configured Custom fields are visible in the work area. They can be filled in with your own Company's information to customize the final report.



4.3.2.1 Customer & Operator information

These fields contain extra information that:

- is either related to the Customer i.e. the company the drives to erase come from,
- or is related to the Operator i.e. the company carrying out the erasure.

These field names are static and cannot be added, removed or modified. However, their default values can be predefined with the B5CT and/or edited in Blancco 5:

Name	Example	Description
Customer name	*Example Company*	Name of the company which owns the machines to erase (can be different than the Licensee).
Customer location	*Anytown*	Location/address of the aforementioned customer.
Erasure provider	*Erasure Company's name*	The company using the tool and performing the erasure (can be different than the Licensee and the Customer).
Erasure technician	*Erasure Company's employee*	The person performing the erasure process.

4.3.2.2 Custom fields

Custom fields are usually created and filled in by the Operator i.e. the person or company that carries out the drives' erasure.

Custom fields are created with the B5CT. The user can customize them:

- By giving them any name he/she wants,

- By filling them in with any default value,
- By setting them as normal or mandatory fields (the latter are marked with a little * sign: report can't be sent / saved until those fields have been filled),
- Examples of custom fields' names: "Asset ID", "Asset type", "Asset value", "Destroy asset"…

For more information, refer to the B5CT user manual.

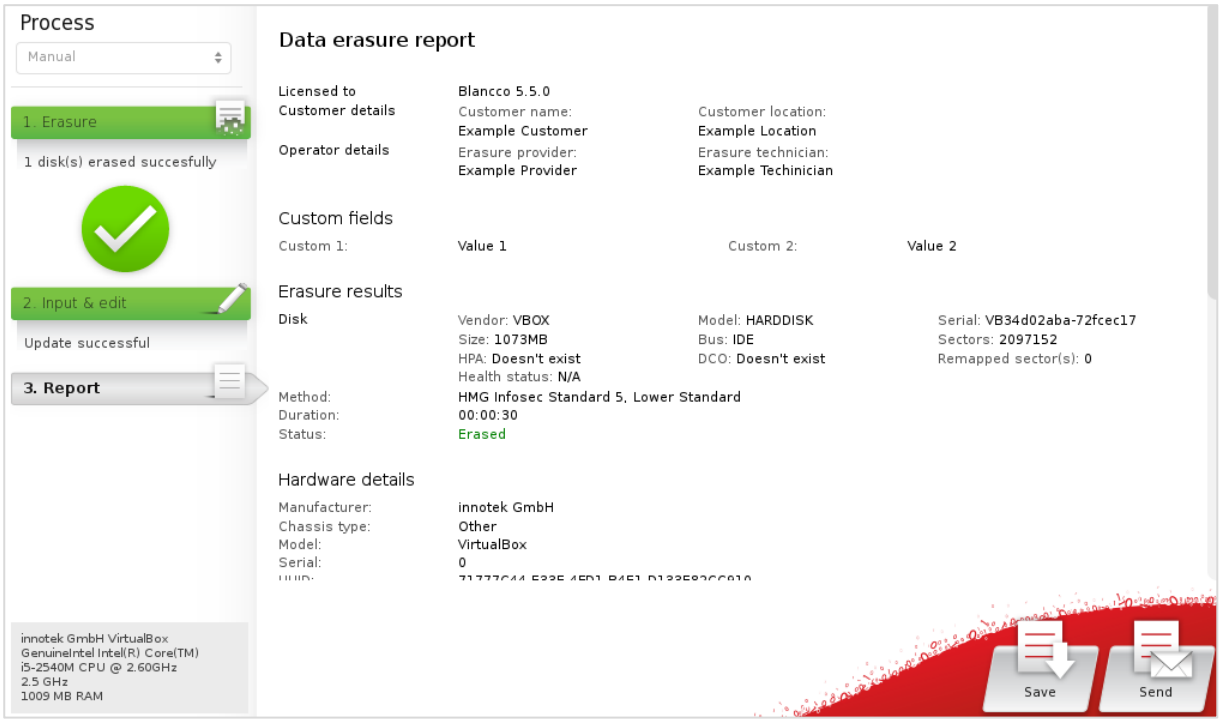
4.3.2.3 Update-button

This button is used to validate all changes. After pressing it:

- all filled-in information will appear in all reports ("Report"-tab, PDF, XML),
- the fields that are left empty will be filtered out from the general reports ("Report"-tab, PDF) but will be visible in the detailed XML report.

4.4 "Report"-step

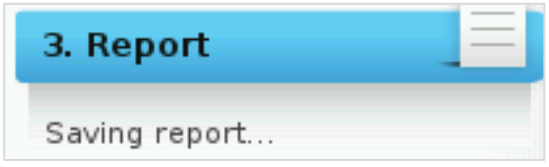
The "Report"-step is the third and final defined default step. In this step, the report can be viewed before, during and after the erasure.

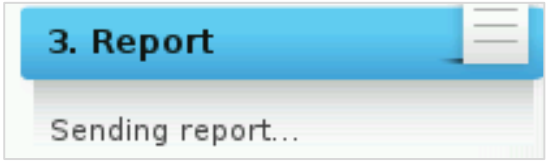


4.4.1 Tab color and overall progress

The "Report"-step tab's color informs of the overall report backing-up progress: not started (gray), ongoing (blue), successful (green), failed (red). The report can be saved, sent or both sent and saved.

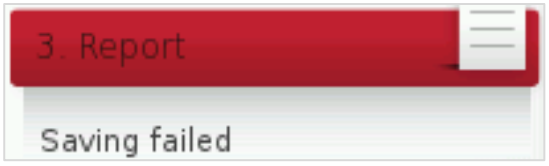
Report tab – report can be viewed but has not yet been backed up.

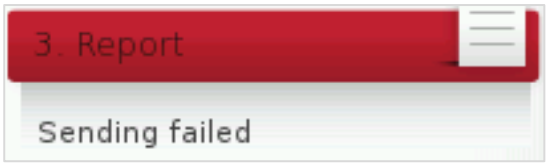




Report tab – report is being saved or is being sent.

Report tab – report was successfully saved or successfully sent.





Report tab – saving or sending the report was unsuccessful.

4.4.2 Work area

The "Report"-step's working area contains the report. It can be viewed before, during and after the erasure of the drives or editing of the fields.

4.4.2.1 Report content

Before the erasure has been completed, the report is simply an asset report which contains information about the hardware of the machine. After the erasure, it becomes an erasure report with combined asset information and erasure information. This report is the unique proof that the erasure has been initialized and completed, which makes it extremely valuable.

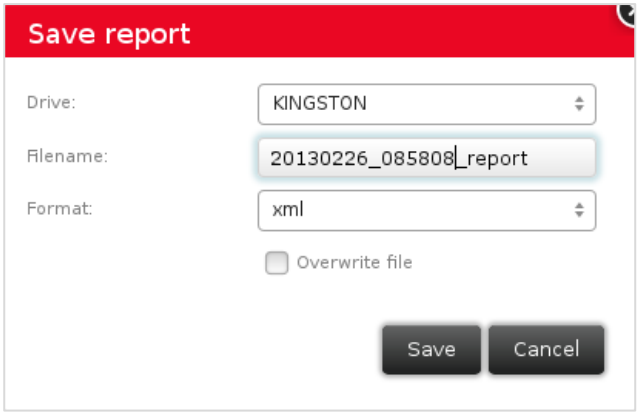
The report is divided into the following categories:

- Licensee/Customer/Operator information (info about the owner of the Blancco license, the owner of the erased machines and the operator executing the erasure),
- Custom fields (information customized by the user/operator),
- Erasure result information (detailed information about the erasure results per erased drive),
- Hardware information (asset report about the host machine),
- Report information (detailed information about the report file itself).

4.4.2.2 Save-button

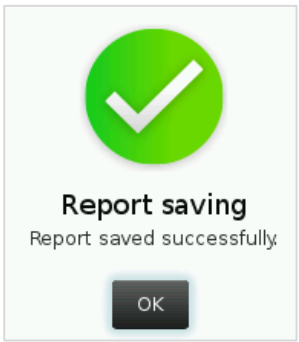
The save button is used to save the report to an external physical media, such as a USB-stick.

Plug your external device (USB-stick) into the machine, then press the "Save" button. The following window is shown:



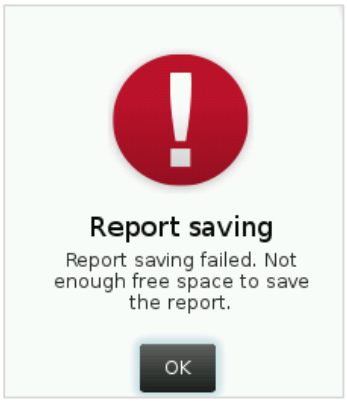
- Choose the desired media from the "Drive" list.
- The name of the report file is displayed on the "Filename" field. The default name of the report follows the format: Date(yyyymmdd)_Time(hh24miss)_report.
    - A report named "20130211_235808_report" was created the 11th of February, 2013 at 11:58:08 PM.
    - This name can eventually be changed before saving the report to the external media.
- Choose the report format from the "Format" list. Possible report formats are:
    - XML (report created with an XML extension, can be imported to the BMC),
    - PDF (report created with a PDF extension, can be printed but cannot be imported to the BMC),
    - XML+PDF (two reports are created, one as a PDF-file and other one as a XML-file)
- Press "Save" to save the report or "Cancel" to exit this window.

If the saving was successful then the following pop up is shown:



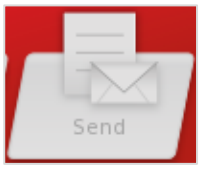
If the report saving fails, an error pop up is shown. This error can occur for numerous reasons, the most common ones being:

- there is not enough free space on the external device
- the external device has been disconnected
- a report file with the same name already exists in the external device
- the report's name contains invalid characters
- the external device is faulty and data cannot be written on it



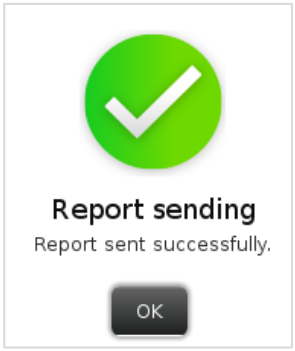
4.4.2.3 Send-button

Send-button is used to send the report to the BMC. If this button is gray and does not respond to clicking, the Communication-settings have not been configured correctly in the Settings-window:



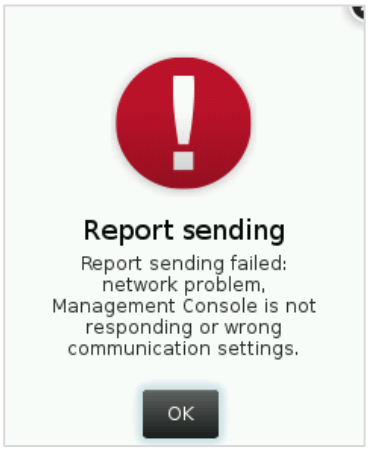
Once the Communication-settings are configured correctly, the Send-button is usable:

When the "Send" button is pressed, the report is sent to the BMC. If the report was sent successfully, the following message is displayed:



If the report sending fails, an error pop up is shown. This error can occur for numerous reasons, the most common ones being:

- The network cable is disconnected or damaged
- The server running the BMC is shut down
- BMC is not running
- Communication-settings are not valid (wrong IP, wrong port, wrong BMC_user, wrong BMC_password)



4.5 Small asset report

The bottom of the Process area contains a "small asset report with the machine's basic hardware information. This report shows:

- the machine model
- the CPU model and frequency
- the RAM amount and its type

More detailed information about the machine is found from the generated report ("Report"-step).

5 KEYBOARD CONTROLS

Blancco 5 can exclusively be controlled with the keyboard only (no mouse required).

5.1 Generic controls

5.1.1 Tab key

The Tab key moves the focus inside a window or inside the Work area (from element to element). The focus moves from left to right, top to bottom, in a circular way. By combining the Shift-key with the Tab-key (Shift + Tab), the direction is reversed (goes backwards: from right to left, bottom to top).

The ☒-button that is visible in the top right of popup/dialog windows cannot be reached via the Tab key. Use the Escape-key to close such windows.

5.1.2 Arrow keys

Whenever the focus is:

- On an area that contains a horizontal and/or vertical scroll-bar (Report-step, Hexviewer, Help window, EULA window…):
  - the Arrow keys can be used to go up/down/left/right inside that area.
- On a drop-down list (list of erasure standards, list of languages, list of keyboard layouts…):
  - the Arrow keys can be used to scroll those lists,
  - combining the Alt key with the down arrow (Alt + down arrow) will expand these lists.
- On a slider's handle (verification slider):
  - the Arrow keys can be used to move the handle.
- On a scrollable container with elements (list of drives in the Advanced-view of the Erasure-step):
  - the Arrow keys can be used to move from one element to another,
  - use up & down arrows to move between the rows (drives),
  - use left & right arrows to access the drive's Pause/Resume and Cancel buttons.

5.1.3 Space bar

Whenever the focus is:

- On top of a check-box:
  - the Space bar selects/deselects it.
- On top of a button:
  - the Space bar pushes it.

5.1.4 Enter key

Whenever the focus is:

- On top of a button:

    - the Enter key pushes it.
- On an element of an expanded drop-down list:
    - the Enter key selects that element.
- On top of a link:
    - the Enter key opens it.

5.1.5 Escape key

Whenever the focus is:

- On top of an expanded drop-down list:
    - the Esc key collapses it.
- Inside an open window (popup, dialog):
    - the Esc key closes it without saving any change (equivalent of Cancel/Close or ☒).

5.2 Accessing the Header area

The buttons of the Header area are accessed exclusively with the function keys.

5.2.1 F1-F4 function keys

- F1 – pushes the Help-button (opens the Help-window).
- F2 – pushes the Report issue-button (opens the Report issue-window).
- F3 – pushes the Settings-button (opens the Settings-window).
- F4 – pushes the Hexviewer-button (opens the Hexviewer-window).

These buttons might differ depending on the version of the software. The logic always follows the same formula: first button on the left of Shutdown-button is F1, next one on the left is F2, etc…

5.2.2 F10 function key

Pressing F10 is similar to pushing the Shutdown-button (opens the Shutdown-popup).

5.3 Accessing the Process area

The steps of the Process area are accessed exclusively with the key combinations Ctrl key + Number keys (1, 2, 3…).

- Ctrl + 1 – selects the first step (Erasure-step).
- Ctrl + 2 – selects the second step (Input & edit-step).
- Ctrl + 3 – selects the third step (Report-step).

These buttons might differ depending on the configuration of the software. The logic always follows the same formula: the first step is accessed with Ctrl + 1, the second step is Ctrl + 2, etc...

5.4 Navigation inside the Work area

5.4.1 Erasure-step

The drives, erasure options and the Erase-button can be accessed with the Tab key and the Arrow keys, but this step has also few key combinations.

5.4.1.1 Ctrl + M

This key combination switches between Standard- & Advanced-views/modes.

5.4.1.2 Ctrl + E

This key combination pushes the Erase-button (starts the erasure).

5.4.1.3 Ctrl + A

When in the Advanced-view, this key combination selects all drives for erasure.

5.4.2 Input&edit-step

The fields and the Update-button are accessed exclusively with the Tab key.

5.4.3 Report-step

The elements and the Save- and Send-buttons are accessed exclusively with the Tab key. Use the Arrow keys to scroll the report content.

6 SCREENSAVER

Blancco 5 screensaver shows the current state of the erasure on the machine's monitor. The following information is displayed:

- The erasure progress bar
- The overall percentage of erasure(s)
- The overall time left to complete the erasure(s)

The screensaver provides a good overview of the ongoing erasures and their final result, whether successful (green icon) or failed/canceled (red icon). The screensaver can be enabled/disabled from the "Settings" window. The screensaver timeout (in seconds) can also be defined in the "Settings" window.

Ongoing erasures

All erasures finished successfully

At least one erasure failed or was canceled

7 BLANCCO 5 SECURITY FEATURES

7.1 Booting Options

The Booting Options are a new feature introduced in Blancco 5.4.0. It allows Blancco 5 to be booted with alternative settings, if there are issues with the default booting.

Blancco 5.5.0 image can be booted in four different ways, each way enabling a different set of features. These four booting options can be accessed by pressing the **up** or **down** arrow key right after the first Blancco 5 static screen appears ("Blancco - Certified Data Erasure", "Starting Blancco 5", "Screen might turn black momentarily - please wait").

7.1.1 Description

These options are:

1. **Normal startup (safe resolution)** –Blancco 5 is loaded using a standard/universal graphical driver. The screen resolution of the GUI is static (1024*768). If any drive is locked, the Freeze lock removal is attempted just before the erasure process (the screen turns black for few seconds then restarts and the erasure begins, see the Freeze lock). This booting option has been tested on several configurations, however the Freeze lock removal procedure may not work in all machines (the standard/universal graphical driver often presents display problems when the machine is awakened).
2. **Normal startup (native resolution)** – Blancco 5 is loaded using any available driver that corresponds to the graphical card of the machine (the standard/universal graphical driver is just a fallback). The screen resolution is the native resolution of the machine (1024*768 or higher). If any of drives is locked, the Freeze lock removal is attempted just before the erasure process (the screen turns black for few seconds then restarts and the erasure begins, see the Freeze lock). This booting option works better than the first option in many/most cases when Freeze lock removal procedure is needed.
3. **FLR during startup** – This is the default option. The Freeze lock removal process is carried out during the booting phase, before loading all the system drivers, to increase the chances to wake up the machine after the freeze lock removal. Then, Blancco 5 is loaded using any available driver that corresponds to the graphical card of the machine. The screen resolution is the native resolution of the machine (1024*768 or higher). This booting option works better than the first option in many/most cases when Freeze lock removal procedure is needed.
4. **Show startup messages** – This is the same option than the second one, except that startup messages are shown in the screen instead of the animated loading screen. This can be used as a troubleshooting measure for machines where Blancco 5 hangs during the booting phase.

7.1.2 When to use the booting options?

Depending on the hardware where Blancco 5 is booted, some issues may arise during the Freeze lock removal process performed by the default booting option (**FLR during startup**), such as

screens staying black or unresponsive machines. In these cases, the suggested procedure is the following:

- Try booting Blancco 5 using the second booting option (**Normal startup (native resolution)**)
- If problems arise with the aforementioned booting option (black screen, machine is unresponsive), try booting Blancco 5 using the first option (**Normal startup (safe resolution)**)

If problems arise during the booting phase (Blancco 5 hangs), try booting Blancco 5 using the fourth option (**Show startup messages**), take note of the last messages shown in the screen before the hanging and contact the Blancco Support.

These options are hidden by default and the time limit to select a booting option other than the default one is 5 seconds.

7.2 Software version

The version number of the software is always on the top left of the graphical user interface, in the Header area.

7.3 Detecting HDDs

Magnetic storage media, such as HDDs, use physical addressing when storing information on a media device. With this addressing, the HDD is divided into smaller parts that can be appointed according to certain parameters. In magnetic media the aforementioned physical parameters are sectors, cylinders and heads. During the computer usage, these parameters enable the operating systems to locate the information on a HDD but they also define the size and storage base of a HDD. A reliable and protected detection of these hardware level parameters is essential and the erasure software must be capable of detecting the correct HDD sizes regardless of the techniques used in altering the HDD information. Failure to accurately detect the HDD may result in an incomplete erasure.

All Blancco data erasure tools utilize hardware level detection for HDDs which enables the software to detect correct HDD sizes regardless of faulty or incorrect BIOS-set HDD values. As a result, the overwriting process will reach the whole HDD surface, leaving no areas untouched.

7.4 Bad sector handling

Even though the incorrectly configured, faulty or damaged configurations cause a potentially remarkable data security risk there are also other gaps that need to be addressed in order to guarantee a secure data erasure process. HDDs can contain damaged areas that cannot anymore be accessed with read or write command, which makes those areas unusable. In data erasure terms, these areas are called physical bad sectors. Data erasure tools must be able to detect and especially report them.

Blancco 5 keeps track of the data erasure procedure and informs if the data erasure (overwrite) cannot be performed due to some error on the HDD. E.g. in case there are any bad sector(s) found on the HDD, the software will try to write a data block to the defective area. If the area

remains "silent", Blancco will try to write a smaller block (half of the original block size) to the defective area in order to overwrite the maximum amount of data. The same procedure will continue until the software tries to write the smallest possible block to the drive and if unable to do so after three tries, the sector will be marked as a physical bad sector. This procedure offers an extremely accurate erasure even in cases of bad sectors so that all the possible areas will be erased and only the real bad sectors/areas will be reported. The bad sectors will be reported in the user interface as well as in the erasure report which is produced after each erasure.

7.5 Remapped sectors

Modern drives have a lot of functions for self-testing, self-recovering and keeping track of their state. One of the possibilities is sector remapping. This allows the drives to detect and hide the sectors, which will either be or have become impossible to access. The drives have a so-called spare area intended precisely for this. When a failed sector is detected, the drive controller assigns the address of the sector to a new one in the spare area. The address remains the same but the owner is changed. The remapped sector may contain some of the user's data. With Blancco 5, the remapped sectors can be erased.

Remapped sector erasure can be selected with any overwriting standard Blancco 5 supports. Erasing remapped sectors can be a time consuming process depending on the drive size and speed.

The erasure standards *(Extended) Firmware based erasure*, *BSI-GS/E*, *NIST 800-88 Purge – ATA* and *Blancco SSD Erasure* include de facto a remapped sector erasure, so selecting or not selecting the "Erase remapped sectors" checkbox won't have any effect on them.

Warning! Avoid turning off the computer, exiting the program, disconnecting the drive(s), pausing/cancelling the erasure during the Remapped Sector erasure process or the drive(s) may be damaged.

Warning! Disable the BIOS HDD detection when using Remapped Sector erasure. In many computers the remapped sectors can be erased even without changing BIOS settings, but by disabling the BIOS HDD detection some problems can be avoided.

Note. When erasing ATA drives with *NIST 800-88 Purge - ATA*, *(Extended) Firmware based erasure*, *BSI-GS/E*, *Blancco SSD Erasure* or when erasing the remapped sectors on those drives, Blancco 5 can erase one drive at a time per ATA channel.

7.6 Freeze lock

If the drive is Freeze locked, removal of the drive's hidden areas or issuing the firmware based erasure commands is not possible.

Blancco 5 detects if at least one of the drives about to be erased is Freeze locked. When a Freeze lock is detected, Blancco 5 tries automatically to remove the Freeze lock by power cycling the machine: the machine is put to sleep, the drives' locks are removed and the machine is woken up. When this power cycling happens the screen usually goes black for a few seconds before

returning. As the machine is power cycled, Blancco 5 attempts to remove the freeze locks on all locked drives at once, so this process occurs at most once per session.

Warning! With some hardware configurations, the screen might not turn back on. This depends heavily on the machine's graphical card and/or the graphical driver used, as some devices do not wake up properly. The erasure process is either interrupted or continues in the background. If such a situation comes to happen, please refer to the Problems with the Freeze lock removal section for advices.

7.7 Hidden areas in a drive

There can be hidden areas in a storage device (HDD, SSD) which cannot be normally accessed even via the BIOS. Blancco 5 can detect and remove these areas. The areas are:

7.7.1 Host Protected Area (HPA)

Blancco 5 can be configured to detect and automatically remove the Host Protected Area. The HPA is commonly used to store the recovery part of the operating system and can contain sensitive data. When a Host Protected Area is found, the entire area is automatically removed.

Note. In order to guarantee the functionality of this option, please disable the BIOS HDD drive detection for proper detection and execution of Blancco 5. In some cases the computer must be rebooted in order to remove the HPA.

7.7.2 Device Configuration Overlay (DCO)

Device Configuration Overlays (DCO) is another but less known optional feature set. It first appeared in the ATA-6 standard. DCO enables the possibility to create a special partition in a drive that the user or the operating system cannot access. This special area of the drive creates a risk that some data might be left on the drive after the erasure unless the erasure product is capable of detecting and also extending and erasing DCO areas. Blancco 5 can be configured to automatically detect and remove the DCO area.

The following table contains a summary of different locking/protection methods supported by Blancco 5:

Drive interfaces	ATA	SATA	SCSI	Fibre Channel
Bad sector detection	YES	YES	YES	YES
Remapped sectors (detection)	YES	YES	YES	YES
Remapped sectors (erasure)	(2) YES	(2) YES	YES	YES
Host Protected Area – HPA (erasure, removal)	(2) YES	(2) YES	(1) Not existing	(1) Not existing
Device Configuration Overlay – DCO (erasure, removal)	(2) YES	(2) YES	(1) Not existing	(1) Not existing

(1) Not existing – this mark means that the technology is not available in the drive standard. For instance, HPA is not supported in the SCSI standard.
(2) Yes, unless the DCO is in "freeze lock" mode and the lock has not been removed.

Warning! Drives that contain HPA and/or DCO areas that have not been removed should not be erased with *NIST 800-88 Purge - ATA*, *BSI-GS/E*, *(Extended) Firmware based erasure*, *Blancco SSD Erasure* or any other standard with the "Erase remapped sectors" feature activated. These actions may cause problems with some drives.

7.8 Erasure verification

The user of Blancco 5 can select the level of verification of the erasure. The verification process reads data at identical intervals across the whole drive's surface and makes sure that the erasure's overwriting patterns were written correctly. The minimum verification corresponds to checking 1% of the surface of the drive (fast process), while the full verification corresponds to checking 100% of the surface of the drive (slower process).

Taking samples at identical intervals across the drive's surface can efficiently detect any problems in the erasure, while being faster than reading all the overwritten data. The user of Blancco 5 can increase the level of verification from the default 1% all the way up to 100% (full verification) when higher level of security is required. If the verification finds any data left on the drive (overwriting patterns are missing), it will alert the user that the erasure process has failed.

A systematic verification step is always enforced after the last overwriting pass.

7.9 Digital Fingerprint

The Digital Fingerprint is a small report that is written on the drive after the erasure and after the user has successfully saved/sent a report. It contains a brief summary of the erasure report information. It acts as a further proof that the storage device has been erased and can be used for erasure report auditing purposes.

The Fingerprint is written on a single sector of the erased drive and visualizing its content requires a tool that can read and display binary data, such as the Blancco 5 Hexviewer. The implementation of the Fingerprint is only in English language (independently of the report language) for compatibility with the ASCII characters.

The Fingerprint contains the following data (separated with spaces and semicolons):

Field name	Description
Customer name	The name of the Company that purchased Blancco ("Licensed to" field from the erasure report). Note: special characters (non-ASCII) are displayed as "?" chars.
Date & time of erasure completion	Displayed with the format: yyyy-mm-dd hh:mm:ss
Blancco software version	e.g. Blancco 5 5.4.1

Drive serial number	Also displayed in the "Erasure"-step.
Erasure status	"Erased" or "Not Erased".
Erasure information message	e.g. "User canceled the erasure" Note: this message may be truncated in case the Fingerprint content is longer than 512 chars (sector size).
Unique report ID	Erasure report UUID.
Key ID	Same than the erasure report's key_id field.
Digital signature	Encoded on 64-chars. Similar to the erasure report's digital signature but generated from the Fingerprint content itself.

The Digital Fingerprint is disabled by default. Enabling it, as well as setting its sector location, is done via the Blancco 5 Configuration Tool.

7.10 Hardware not supported by Blancco 5

7.10.1 Unsupported processors

Blancco 5 supports x86 processor-based machines, however some machines use different processor architectures (RISC, ARM…) that Blancco 5 does not support and cannot directly erase. Sun SPARC based servers can be erased using our Blancco SPARC product.

Fortunately, data storage devices are always the same regardless of the hardware (whether x86 or RISC architecture) and Blancco can be used to erase the drives from these machines by connecting them to an x86 processor-based computer. A typical solution consists of removing those drives from their non-supported server and connecting them to a supported x86 processor-based "erasure station" for erasure.

Blancco 5 cannot presently boot on (nor erase) 32-bit UEFI machines (even if they are x86 processor-based). This is the case of e.g. several tablets using the Atom processor with a system on chip platform such as the "Clover Trail" platform.

7.10.1 Unsupported drives

Drives can be manufactured with different sector sizes. Although drives with sector sizes of 512 bytes are the most popular (traditional formatting), some rare drives possess sectors with slightly bigger sizes of e.g. 520 bytes. Newer drives use 4096 bytes sectors (Advanced Format).

Blancco 5 supports drives with 512 bytes sector size. Drives with e.g. 520 bytes sector size are currently not properly supported. Drives with 4096 bytes sector size are supported if they offer a 512 byte emulation layer (Advanced Format 512 emulation or 512e), but they are not properly supported if they do not provide that emulation layer (Advanced Format 4K native or 4Kn).

7.10.2 SSDs

Although Blancco 5 can identify and erase all kind of Hard Disk Drives (where data is stored magnetically on rotating disks), there are some caveats involved regarding the erasure of Solid State Drives (SSD). SSDs differ from HDDs in that data is stored electronically on transistor arrays. Please refer to the chapter Guidelines for Using SSD Erasure Method for more information.

If the documentation does not help you, please engage with your local Blancco representative regarding the erasure of these drives.

7.10.3 RAID-controllers

Blancco 5 supports most RAID-controllers attached to SCSI drives. However, Blancco 5 does not currently fully support all RAID-controllers attached to SAS or SATA drives, with the exception of the MegaRAID controller and HP Smart Array.

The MegaRAID controllers can be purchased by different original equipment manufacturers (OEM) or brands which can resell them with their own firmware: the support of the MegaRAID depends heavily on the firmware that has been embedded into the controller. Currently Blancco 5 supports MegaRAID controllers branded by LSI (SAS and SATA drives) and Dell (SAS drives only). Support of other brands (mainly HP and Intel) is not fully guaranteed.

Support for other SAS/SATA RAID controllers will be implemented in upcoming versions.

8 TROUBLESHOOTING

8.1 Burning the *.iso image / Creating the CD

'Dragging and dropping' the file onto the CD-R or CD-RW is NOT possible. An ISO file is an image file which contains many smaller files that must be extracted to the CD at the time of burning. By performing the burn process properly, the ISO image will create a possibility to boot your computer from the CD.

ImgBurn: How to Burn

ISO Recorder: Recording ISO files

8.2 Accessing the BIOS and changing the boot sequence

In order to boot the Blancco software set the used device (USB, CD, Network booting) as the first booting device.

To change the boot sequence, you must enter the "Setup" or "CMOS Setup" on your computer and change the booting sequence to use the USB drive/CD drive/Network adapter first. There are several ways to enter the setup depending on your computer manufacturer and model. During the booting stage a message will appear stating "Press DEL to enter Setup". As the message flashes only once on the screen, you must be quick to press the key before the boot sequence continues. Please note that the boot sequence may continue without any user intervention.

The [Delete] Key and [F2] are the two most common keys

We have collected some of the key combinations in order to get into the BIOS. On most systems you need to press these keys repeatedly during the POST (Power On Self-Test) as soon as the computer has been turned on. If the Windows Logo appears, you are too late, restart the computer and try again.

Computer Model	BIOS Keys
Acer®	F1, F2, CTRL+ALT+ESC
AST®	CTRL+ALT+ESC, CTRL+ALT+DEL
Compaq® 8700	F10
CompUSA®	DEL
Cybermax®	ESC
Dell® 400	F3, F1
Dell Dimension®	F2 or DEL
Dell Inspiron®	F2
Dell Latitude	Fn+F1 (while booted)
Dell Latitude	F2 (on boot)
Dell Optiplex	DEL
Dell Optiplex	F2
Dell Precision™	F2
eMachine™	DEL
Gateway® 2000 1440	F1
Gateway 2000 Solo™	F2
HP®(Hewlett-Packard)	F1, F2
IBM®	F1
IBM E-pro Laptop	F2

IBM PS/2®	CTRL+ALT+INS after CTRL+ALT+DEL
IBM Thinkpad® (newer) Windows:	Start | Programs | Thinkpad CFG.
Intel® Tangent	DEL
Micron™	F1, F2, or DEL
Packard Bell®	F1, F2, DEL
Sony® VIAO	F2, F2
Tiger	DEL
Toshiba® 335	CDS ESC
Toshiba Protege	ESC
Toshiba Satellite 205 CDS	F1
Toshiba Tecra	F1 or ESC

8.3 Booting on machines with UEFI

Blancco 5 may face some issues when booting on machines that use EFI/UEFI.

The B5 UEFI support (available from 5.4.x versions) requires some mandatory conditions:

- Booting from a CD does not work properly, prefer instead booting with a bootable USB-stick previously formatted with Blancco USB Creator.
    - The USB Creator version has to be at least the 2.1.0.58 (or newer).
- The UEFI machine where Blancco 5 is booted has to be an x86 and 64-bit processor (Blancco 5 UEFI infrastructure is 64-bit).
    - B5 cannot presently boot on (nor erase) 32-bit UEFI machines.

8.3.1 Disabling the Secure Boot

Any PC with a Windows 8 logo sticker has a "Secure boot" enabled by default. Secure boot is an UEFI feature that can make Windows 8 very resistant to low-level malware such as rootkits. Blancco 5 may not properly boot on a machine where the Secure Boot is enabled, in which case this feature has to be manually disabled.

The following steps will demonstrate how to enable or disable the Secure Boot in the PC's UEFI settings:

8.3.1.1 General steps

1. Boot to UEFI Firmware Settings.
2. In the motherboard's UEFI firmware settings, go to the Security/Authentication (or similar) menu, select the Secure Boot option and disable it.
3. Exit the menu and select **Save Changes and Exit**. This reboots the machine.

Secure Boot can be enabled again, following the same logical steps.

8.3.1.2 Windows Surface Pro

1. Plug in a USB keyboard to the device.
2. Power on the device and let it boot to the Windows login screen.
3. Press the power icon on the bottom right corner of the screen. Hold down left shift key and select restart.
4. The device should reboot into a blue "Choose an Option" screen
5. Select "Troubleshoot" -> "Advanced Options" -> "UEFI Firmware Settings" -> "Restart".

6. UEFI firmware setup screen should show up. Make sure that "Secure boot control" is disabled and save the settings.

8.3.2 Booting with a Blancco 5 USB-stick

It is possible to boot Blancco 5.5.0 on a machine that has UEFI with a bootable USB-stick. Nevertheless, changing the booting options (see the Booting Options) may not work on these machines as only the default booting option's parameters are taken into account.

Try the following to overcome this issue:

- If the machine has UEFI and BIOS, the easiest solution is to use the BIOS-mode to boot the machine.
- If the machine has UEFI and no BIOS, you can create a bootable Blancco 5 USB-stick with the Blancco USB Creator 2.1.0.58 or newer. This version (or newer) adds the Booting Options as a second menu right after the main boot menu.

8.4 Blancco 5 hangs during the booting

You may find yourself with a machine where Blancco 5 hangs during the booting phase. If this situation occurs:

1. Boot Blancco 5 and press the **up** or **down** arrow key right after the first Blancco 5 static screen appears ("Blancco - Certified Data Erasure", "Starting Blancco 5", "Screen might turn black momentarily - please wait").
2. Select the booting option "**Show startup messages**" which will display startup messages during the booting instead of the animated loading screen.
3. Take note of the last messages shown in the screen (before the hanging), contact the Blancco Support and provide them with the messages.

8.5 Booting without a display adapter

Blancco 5 can be booted and used without a display adapter, but it must be remotely controlled via the BMC 3.

The following requirements must be met:

1. The process has to be set as "Manual".
    - Default erasure process, this can also be configured via the B5CT
2. The Blancco 5 image has to be remotely controlled via the BMC 3 and the correct communication settings have to be in place.
    - This can be configured via the B5CT (erasure control = "Blancco Management Console remote", communication settings filled in).
    - If the communication settings are not correct, Blancco 5 will run, but it will not be able to receive any orders from the BMC 3.
    - The BMC 3 can start the erasure remotely, monitor it and fetch the erasure report in the end.

Any other configuration will result in a non-functional Blancco 5 image.

In case the booting is done via USB-stick, the line

"splashimage=/syslinux/blancco.xpm"

has to be removed from the **menu.lst** file on the bootable usb-sticks root. Otherwise the USB booting will not work.

8.6 SATA drives not detected/not available in the User interface

1. Problem description:

Blancco 5 has started and the drive selection shows one or more drives are missing from the drive selection.

2. Problem explanation:

One or more SATA drives in **IDE/ATA**-mode cannot be detected or are not showing in the Blancco 5 User Interface.

Drives might also be broken.

3. Problem solution:

SATA drives need to be set in either "**AHCI"** or "**SATA native"** mode (or similar) from BIOS/UEFI/EFI. The IDE-mode for SATA-drives is not supported by Blancco 5.

8.7 Problems with the Freeze lock removal

If drives are freeze locked, Blancco 5 will attempt to remove the locks by power cycling the machine: the screen turns black for few seconds before returning. Depending on the booting option used to boot Blancco 5 (see the Booting Options) or the configured erasure process ("Manual", "Semi-automatic" or "Automatic", see the Processes), the Freeze lock removal may occur before the GUI starts or right before an erasure process starts. Unfortunately in some hardware configurations the screen might not turn back on, the user faces then three situations:

I. The screen stays black and an erasure process starts in the background: the drive's light starts blinking as the drive is being actively erased.
   In this situation only the screen is missing, if the user wants to monitor the erasure a workaround consists in monitoring it via the BMC 3. After the erasure, the report can also be fetched. Please refer to the B5CT and BMC manuals for more information about this feature.

II. The screen stays black and nothing starts in the background, however the machine is on (lights are on, fans are working).
   In this situation the screen is missing but the drives are most likely detected and ready for erasure, if the user wants to start and monitor the erasure a workaround consists in controlling it via the BMC 3. After the erasure, the report can also be fetched. Please refer to the B5CT and BMC manuals for more information about this feature.

III. The screen stays black and the machine is unresponsive (lights are off, fans are not working).
   In this situation, the Freeze lock removal is most likely paused or has failed. There are three ways to proceed:
   a) With some old machines, the Freeze lock removal process may be paused because the machine has not got enough time to restart. Try to push the machine's power button for 1

second or so to wake up the machine and restart the Blancco GUI / begin the erasure (after this, you may end up with a working screen or in the case I or II).

b) If the previous does not work, the Freeze lock removal process has likely failed. Next, try to remove the drive from the machine and connect it to a motherboard that doesn't enforce Freeze lock (as the Freeze lock itself is an entirely BIOS dependant feature).

c) Otherwise, unplug either the signal or power cable of the drive. This requires that the following steps are performed:
   1. Shut down the computer system.
   2. Unplug the signal cable* or four-wire power cable of the drive while leaving the signal cable plugged in.
      i. To eliminate the danger of Electro Static Discharge, always ground yourself when removing the power cord.
   3. Power on the system and boot the Blancco software.
   4. When the software is loading i.e. you see the progress bar, plug the signal/power cord of the drive back in.

   *The signal cable is the preferred option and should be attempted first. If the freeze lock remains after attempting the boot with signal cable removed, attempt the boot with the power cord removed.

   This method is not recommended by Blancco, as the drive may result damaged in the process.

Note. Keep in mind to always try the other Booting Options if you face any similar situation.

Warning! Shutting down a machine when the drives are being erased with *NIST 800-88 Purge – ATA, BSI-GS/E*, *(Extended) Firmware based erasure*, *Blancco SSD Erasure* or any other standard with the "Erase remapped sectors" feature activated can damage the drives.

8.8 HP Smart Array erasure

1. Problem description:

Some versions/models of the HP Smart Array RAID controller have problems with the erasure verification (it always fails, regardless of erasure standard) that end up in a failed process (status = "Not erased", information = "Verification failed. X sector(s) failed to overwrite").

2. Problem explanation:

This problem is related to one of the controller's settings called the surface scan delay. This setting is the time interval before surface scan analysis activates (possible values from 1-30 sec.). This time does not begin counting until there are no commands being sent to the controller. Surface scan analysis is a background process that scans hard drives for bad sectors in fault tolerant logical drives. In RAID 5 or RAID ADG configurations, surface scan also verifies the consistency of parity data.

Whenever the erasure part is completed, the surface scan is activated during the verification part and the controller starts writing some meta/RAID data on the drives. This naturally provokes the

verification failure and subsequently the whole erasure process failure. Unfortunately, the surface scan cannot be disabled nor delayed more than 30 seconds.

3. Problem workaround:

This problem can be worked around in the following way:

1. If you happen to have a HP Smart Array RAID controller that presents this problem, before booting Blancco 5, remove manually all of the RAID logical array configurations.
2. Boot Blancco 5 and follow the normal erasure procedure.
    a. Some HBAs will create (a) logical array(s) automatically during boot if they find unassigned physical disks which don't belong to any RAID array. That automatic creation has to be manually skipped by pressing ESC (this key press might vary, see hardware's documentation for more info) to prevent the problem from happening again.

9 APPENDIX 1: SSD SUPPLEMENT

9.1 Guidelines for Using SSD Erasure Method

The following guidelines should be carefully followed when erasing an SSD:

- Currently the SSD Erasure Method is only designed to erase SSDs that use the ATA interface and support the firmware based erasure commands.
    - **For these drives, the recommended and most thorough erasure standard available in the software is Blancco's SSD Erasure Standard**. However, if your erasure policy mandates that a different process should be applied for these drives, other options can be selected but a message will appear on the report highlighting that an SSD was erased.
    - If the SSD you are trying to erase does not support the firmware command or it is not possible to remove the freeze lock, it is not possible to erase the SSD with Blancco's SSD erasure method.
- It is recommended that only **one** SSD should be erased per machine at a time. The success of erasure can be affected if two drives are attempted to be erased simultaneously. It is also recommended that only a single drive be attached to the host machine for erasure.
- The whole drive should be erased, **do not erase individual partitions**. The use of firmware based erasure commands will not work on partitions on an SSD. The whole drive must be erased when using Blancco's SSD method.
- The SSD should not be connected to the machine through additional pieces of hardware such as USB/FireWire docking stations or PATA/SATA bridges. These could prevent the software's ability to issue the firmware erasure command, resulting in a failed process.
- There should also be no instance of a RAID configuration for SSDs being erased. If two SSDs are attached to the host machine, erase a single drive at a time.
- If the SSD is not shown on the drive selection screen, or the erasure process cannot be run due to non-access to firmware based erasure command, one possible solution is to change the SSD's mode from IDE/ATA-mode to AHCI/Sata Native-mode (via the appropriate BIOS/UEFI/EFI settings).

9.2 Erasure Result

9.2.1 Status

The end result of an erased SSD (using Blancco's SSD method) can be one of only two states: erased (success) and not erased (failed or canceled by the user). An erased drive constitutes one that has had the whole erasure and verification processes completed, without any identified errors. The drive is also checked for responsiveness once erased and must present itself in an operational condition.

9.2.2 Failure Logic

Blancco's SSD erasure solution follows a multistep erasure and verification process – if any of the steps fail, the whole process results in a fail. This will result in an erasure report stating that the erasure process has not been successful. The logic for erasure failure includes the following:

- An SSD being erased must allow the firmware level erasure process to execute. The software will reject those that do not support these commands, as it is an essential part of the SSD erasure method. If the software cannot access the firmware command, for any reason, the drive's erasure will result in a fail.
    - If an SSD has an ATA Master Password set, it is not possible to access the firmware erasure command or write data to it. This password must be removed before erasure can be considered. If it is not possible to retrieve the password or somehow bypass it to unlock the drive, it cannot be erased.
    - Drives that have a freeze lock placed on them by the host machine's BIOS will not allow access to the firmware erasure command. The latest versions of Blancco's software will attempt to automatically remove the lock. Please see the appropriate part of the manual for further guidelines on removal.
- The verification stage of SSD erasure must be completed successfully. If it cannot complete, the erasure is considered a fail.
    - The verification of an SSD must show that no data has remained on the device (at the logical level). If anomalies are found, the erasure report will state a failed process.
    - There is a possibility that some encrypting SSD models will appear to consistently fail erasure because verification will fail. See the *Failed Erasures* section below for further information on handling.
    - Some drives may claim to support certain firmware erasure commands but do not perform any erasure of data when initiated. If any kind of remnant data is found, erasure will result in a fail. This is a key security requirement.
    - Variations in drive implementations may mean that some drives require a slightly different process – see *Failed Erasures* section below for further details.
- If the SSD experiences any issues when writing data, erasure is considered to fail due to possibility that the disk may be faulty or near its end of life.

9.3 Handling Information

9.3.1 Erasure Method

The Blancco erasure software will recognize that an SSD has been detected and will automatically recommend the use of Blancco's proprietary method for SSDs. Blancco's SSD erasure method combines different techniques to provide the best security available and may exceed the

requirements of other erasure standards. However, the sanitization process is ultimately mandated by the user of the software and based on their internal policy. For example, the policy may be to strictly adhere to NIST 800-88 and apply those processes.

9.3.2 Inoperable Drives

It is possible that SSDs containing firmware that is flawed or have some other operational deficiency (possibly due to being near to the end of their life) will be subject to malfunction as a result of the erasure process. This highlights drives that are faulty, regarding their internal erasure or operational methods. When an event arises whereby an organization decides that an SSD is considered to be either unserviceable or have security concerns about a drive, possibly due to a failed erasure process or some other reason, further disposition considerations are required: The organization handling the SSDs should consider if a destructive process is required on drives that enter an unresponsive state.

It is also possible that the drive's OEM (or a data recovery lab) can return the SSD to an operational condition. Guidance should be sought from the relevant vendor in this case. It should be noted that (during Blancco's testing operations) this situation has occurred in only a few cases.

When proceeding with the erasure of drives, it is advised to monitor the results and the effect that erasure has on them. This will help to identify particular models that become unresponsive post erasure.

Details on drives that have been found to consistently 'brick' after calling firmware erasure commands can be found at: http://www.blancco.com/ssdinfo.

9.3.3 Failed Erasures

Blancco's SSD erasure method applies strict verification requirements in order to provide a holistic approach to SSD erasure and mitigate the issues highlighted by previous research. If a drive does not support the firmware erasure commands (**not** because of a BIOS issued freeze lock), then there are some alternative reason:

- **Verification Issues**

  In the case of drives that consistently fail verification (the report will indicate when this occurs), it is possible that the drive will require some additional process or analysis. If this situation arises, please contact your local Blancco representative. Blancco is seeking to identify these models and attain details of drive operations from OEMs in order to offer assurances of security and/or specific methods for handling these drives.

- **Firmware Upgrading**

  SSD vendors often develop and issue firmware updates over the lifetime of a drive. The firmware updates may be developed to address some technical issue or bug found after the SSDs are released to consumers. Updated SSD firmware usually implies performance improvements, security updates or improved drive reliability.

SSD models that consistently fail erasure could benefit from a firmware update to improve the robustness of their internal operations[1]. Blancco has provided some information on how to access the firmware upgrade procedures for various manufacturers. The details can be found at: http://www.blancco.com/ssdinfo.

[1] Blancco is not in a position to guarantee the success or otherwise of firmware updates. There is also no certainty that this will improve the result of erasure.

10 APPENDIX 2: EXECUTION STEPS OF THE ERASURE STANDARDS

* = depends on the value user has given. See chapter on Verification, for more info.

ESE = Enhanced Secure Erase

SE = Secure Erase

FU = Format Unit

→ = fallback procedure

10.1 Magnetic standards

HMG Infosec Standard 5, Lower Standard	Step #
Overwrite with 0x00	1.

HMG Infosec Standard 5, Higher Standard	Step #
Overwrite with 0xAA	1.
Overwrite with 0x55	2.
Overwrite with random byte	3.
Verify data*	4.

DoD 5220.22-M	Step #
Overwrite with 0x55	1.
Overwrite with 0xAA	2.
Overwrite with random byte	3.
Verify data*	4.

DoD 5220.22-M ECE	Step #
Overwrite with 0x55	1.
Overwrite with 0xAA	2.
Overwrite with random byte	3.
Overwrite with aperiodic random data	4.
Overwrite with 0x55	5.
Overwrite with 0xAA	6.
Overwrite with random byte	7.
Verify data*	8.

Bruce Schneier's Algorithm	Step #
Overwrite with 0xFF	1.
Overwrite with 0x00	2.
Overwrite with aperiodic random data	3.

Overwrite with aperiodic random data	4.
Overwrite with aperiodic random data	5.
Overwrite with aperiodic random data	6.
Overwrite with aperiodic random data	7.

Navy Staff Office Publication (NAVSO P-5239-26)	Step #
Overwrite with 0xFFFFFFFF	1.
Overwrite with 0xFFFFFFE4	2.
Overwrite with aperiodic random data	3.
Verify data*	4.

National Computer Security Center (NCSC-TG-025)	Step #
Overwrite with 0x35	1.
Overwrite with 0xCA	2.
Overwrite with 0x97	3.
Overwrite with aperiodic random data	4.
Verify data*	5.

Air Force System Security Instructions 5020	Step #
Overwrite with 0x00	1.
Overwrite with 0xFA	2.
Overwrite with 0x00	3.
Overwrite with 0xAA	4.
Verify data*	5.

U.S. Army AR380-19	Step #
Overwrite with random byte	1.
Overwrite with 0xAA	2.
Overwrite with 0x55	3.
Verify data*	4.

OPNAVINST 5239.1A	Step #
Overwrite with 0xFF	1.
Overwrite with 0x00	2.
Overwrite with random byte	3.
Verify data*	4.

NSA 130-1	Step #
Overwrite with aperiodic random data	1.
Overwrite with aperiodic random data	2.
Overwrite with 0x00	3.
Verify data*	4.

Peter Gutmann's Algorithm	Step #
Overwrite with aperiodic random data	1.
Overwrite with aperiodic random data	2.
Overwrite with aperiodic random data	3.
Overwrite with aperiodic random data	4.
Overwrite with 0x555555	5.
Overwrite with 0xAAAAAA	6.
Overwrite with 0x924924	7.
Overwrite with 0x492492	8.
Overwrite with 0x249249	9.
Overwrite with 0x00	10.
Overwrite with 0x11	11.
Overwrite with 0x22	12.
Overwrite with 0x33	13.
Overwrite with 0x44	14.
Overwrite with 0x55	15.
Overwrite with 0x66	16.
Overwrite with 0x77	17.
Overwrite with 0x88	18.
Overwrite with 0x99	19.
Overwrite with 0xAA	20.
Overwrite with 0xBB	21.
Overwrite with 0xCC	22.
Overwrite with 0xDD	23.
Overwrite with 0xEE	24.
Overwrite with 0xFF	25.
Overwrite with 0x924924	26.
Overwrite with 0x492492	27.
Overwrite with 0x249249	28.
Overwrite with 0x6DB6DB	29.
Overwrite with 0xB6DB6D	30.
Overwrite with 0xDB6DB6	31.
Overwrite with aperiodic random data	32.
Overwrite with aperiodic random data	33.
Overwrite with aperiodic random data	34.
Overwrite with aperiodic random data	35.

10.2 Firmware and forced standards

Firmware Based Erasure	Step #
-For ATA drive: ESE → SE	1.
-For SCSI drive: FU	1.
Verify data* (pattern verification)	2.

Extended Firmware Based Erasure	Step #
Overwrite with 0xCB	1.
-For ATA drive: ESE → SE	2.
-For SCSI drive: FU	2.
Verify data* (pattern verification)	3.

NIST 800-88 Clear	Step #
Overwrite with aperiodic random data	1.
Verify data*	2.

NIST 800-88 Purge - ATA	Step #
-For ATA drive: ESE → SE	1.
-For other type of drive: erasure standard not compatible (erasure won't start)	1.
Verify data* (pattern verification)	2.

BSI-GS	Step #
Remove HPA/DCO (if existing)	1.
Overwrite with aperiodic random data	2.
-For ATA drive: ESE → SE → Overwrite with 0x00	3.
-For SCSI drive: FU → Overwrite with 0x00	3.
Verify data* (pattern verification)	4.

BSI-GSE	Step #
Remove HPA/DCO (if existing)	1.
Overwrite with aperiodic random data	2.
Overwrite with aperiodic random data	3.
-For ATA drive: ESE → SE → Overwrite with 0x00	4.
-For SCSI drive: FU → Overwrite with 0x00	4.
Verify data* (pattern verification)	5.

10.3 SSD Standards

Blancco SSD Erasure - ATA	Step #
Proprietary process[1]	…

[1] Contact Blancco for more information

11 CONTACT INFORMATION

Visit the technical knowledgebase (FAQ) and contact Blancco Technical Support by submitting a technical support ticket at:

http://support.blancco.com/

See the instructional videos for Blancco products at:

http://www.blancco.com/en/videos/

For contact information and the latest information about secure data erasure solutions, visit the Blancco website at:

http://www.blancco.com

We are always looking for ways to improve our products. Please let us know if you have any suggestions!